Uniden's Down to Earth Guide to Satellite Television.

Uniden's Down-to-Earth Guide to Satellite TV

by Mark Long

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Table of Contents

Introduction 7

Part One: The Satellite TV Revolution 10

1 • A History, However Brief, of Satellite TV 11

Telstar and Early Bird • The Intelsat Global Satellite Network • Satellites Over America • Home Box Office and WTBS • Early Satellite TV Pioneers • Satellite TV Today • How Legal Is It All?

2 • Your Old TV Was Never Like This 17

Hollywood Unchained • Sports Channels • Adding a New Dimension to Music • Educate Yourself by Satellite • All the News and Then Some • Let Them Entertain You • The Great Super Stations • All the Usual Network Fare • There's Lots for the Tots • Gimme That Old Time Religion • Erotic Entertainment • For the Multi-Lingual • Satellite Radio Stations Too! • With All This Programming, How Can You Ever Decide What to Watch?

3 • The Hitchhiker's Guide to the Satellites 34

It All Starts at the Studio • Uplinks, or Getting There is Half the Fun • More on the Geostationary Orbit • Bird's Eye View • Satellite Footprints • Parking Problems • The Satellite Receiving System

Part Two: A Consumer's Guide to Satellite TV Systems 45

Choosing the System That's Right For You 46

4 • Buying a Satellite TV Dish 47

Checking the Dish • Understanding Antenna Specifications • Antenna Efficiency • Antenna Gain • Deep Dish is Not Just for Pizza • Antenna Mounts • Moving the Dish • Choosing an Antenna Actuator System • Feedhorns and Polarizers • Polarizing the Signal

5 • Buying a Home Satellite TV Receiver 63

Downconverters • Single, Double or Block Downconversion • The ABC'S of LNA's • LNB's • LNC's • Basic Receiver Knobs, Dials and Buttons • Satellite Receiver Extras • Receiver Threshold • Pre-Installation Checklist

6 • Satellite TV Accessories 72

Stereo Processors • Large-Screen Projection TV Systems • Video Monitors • Video Cassette Recorders • Home Computers and Your Earth Station • Stay Ahead of the Joneses with a Video Switcher • Descramblers to Unscramble the Scramblers • Cable TV Accessories • Hooking Two or More TV Sets to Your Satellite TV System • Filtering Out Trouble • Video Processors and Image Enhancers • You Can Take It With You

Part Three: Satellite Operators Handbook Or Learning How To Do It Without the Usual Hassle 84

7 • Navigating the Satellite Superhighways 85

Aiming Your Dish by Hand • The Acme—Motorized Positioning • Satellite Designations • Signal Polarity • Adjusting the Skew • Using the Signal Strength Meter • Moving the Dish for the First Time • What To Do if You Get Lost: Using the Receiver's Scan Feature • Using a Computerized Dish Aimer • Advanced Satellite TV Navigation • The Satellite Sports Extravaganza • The Satellite News Adventure

8 • Satellite TV Ailments and Remedies 105

Video Problems • Audio Problems • Control Problems

Part Four: New Worlds to Conquer 112

9 • Exploring the Higher Frequencies 113

Advantages of Ku-Band Satellite TV • Operational Ku-Band Satellites • The ANIK C Satellites • ANIK C3 Program Guide • Canada's ANIK C2 Satellite • DBS: Satellite TV of the Future • Making the Small Dish Work • The Long-Term Chances for DBS • STC—Satellite Television Corporation • Other DBS Corporations

Appendix

A Glossary of Satellite Terms	**124**
Satellite TV Program Guides	**126**
Scrambled Satellite TV Services	**126**
Satellite Channel Chart	**127**
About the Author	**128**

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Introduction

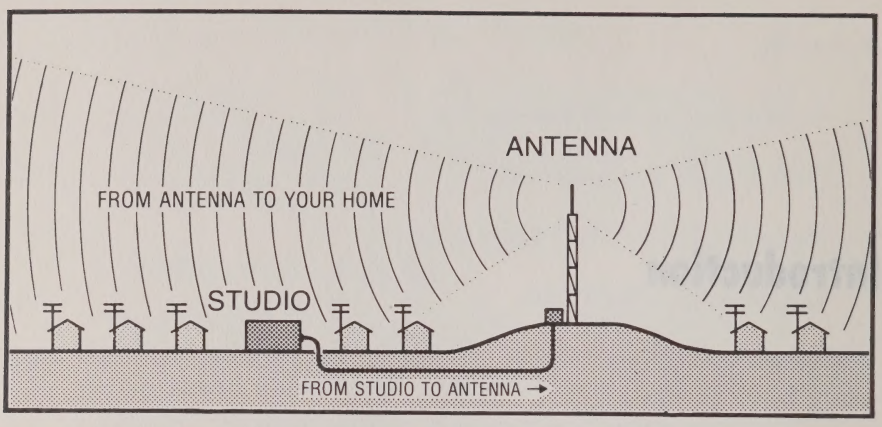
Forty years ago television transformed our lives. Here we go again.

The future is here. Imagine being able to watch over 150 channels every day of the week; channels from all over the United States, Canada, Mexico, Europe—even Russia.

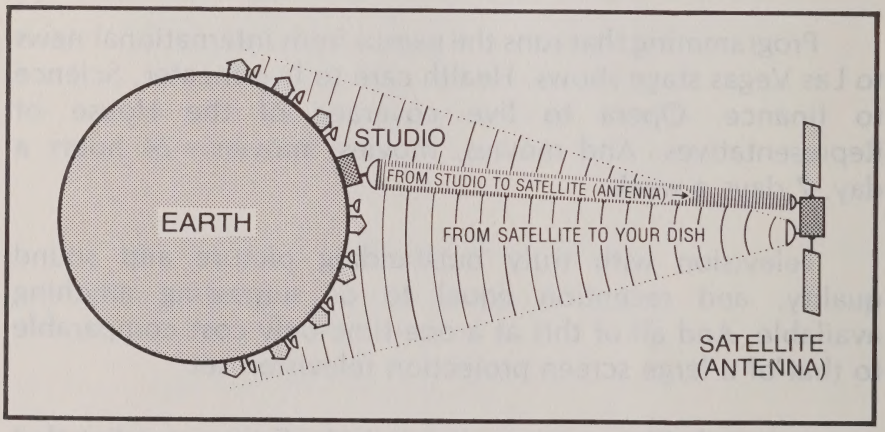
Programming that runs the gamut from international news to Las Vegas stage shows. Health care to live theater. Science to finance. Opera to live coverage of the House of Representatives. And movies, movies, movies—24 hours a day, 7 days a week.

Television with truly outstanding picture and sound quality, and reception equal to or surpassing anything available. And all of this at a one-time-only cost comparable to that of a large screen projection television set.

It sounds like a dream, but it isn't. Experts predict that more than ten million households will have some kind of satellite receiving system by 1990. I intend to give you a good sense of it all; to tell you everything you'll need to know so you can decide what kind of system you want, and how to get the maximum performance from it.



Perhaps you feel that receiving satellite TV is like booking a seat on the space shuttle—too daring and complicated an adventure for you at this moment in time. Not true. There may be a few more knobs and buttons, but it's not really that much different from your regular TV. You watch local TV channels by pointing your roof antenna towards stations that broadcast from nearby cities. You receive satellite television by aiming your dish antenna at distant satellites orbiting the earth.



First off, I promise I'm not going to bore you with unnecessary technical information; after all, it's the entertainment, not the electronics that interests most people. But as with most new technologies, there are a few things you'll need to know in order to get the most from your system.

There's a bewildering array of satellite-receiving equipment available today. Satellite TV systems have all kinds of "bells and whistles"—buttons, knobs, switches and fancy circuitry—that do everything but brush the kids' teeth before bedtime. Buying a satellite system is a large investment for most families, and should not be made without adequate information. I'll explain the purpose and advantages that each feature provides, so you can make an informed selection that satisfies your particular needs.

Everyone in your family should understand the basics of how to operate your satellite TV system. After all, navigating your dish from satellite to satellite without getting lost *is* a bit different from just spinning the old TV dial. There are more components in the system, and some need occasional adjustment. With all that video and audio programming beaming down, you'll need a guide to what's up there and how to find it all. I'll give you a "road map" of the satellite superhighways, with clearly defined routes to your program destinations that will keep you from straying off the beaten path.

Included is a glossary of terms for easy reference. Then when your friends come over and say they'd like to watch the "birds," you'll know they're talking about satellite TV and not the bluejays and robins.

Join the millions of people who have already entered the magical realm of satellite TV. When you can have the world at your fingertips, why settle for less?

Part One:
The Satellite TV Revolution

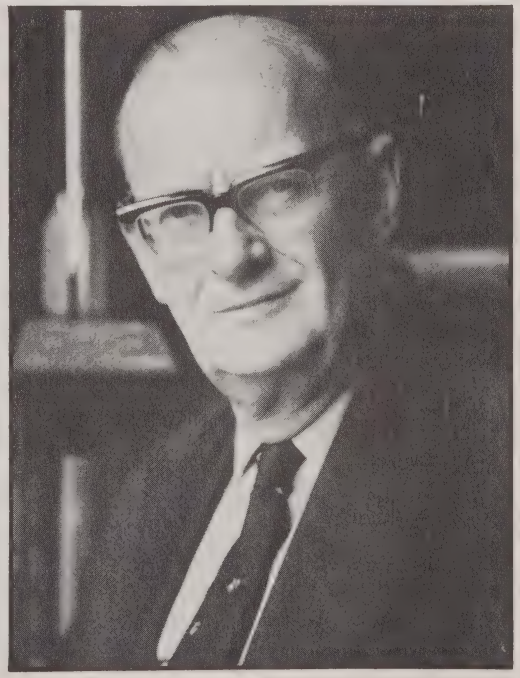
1 • A History, However Brief, of Satellite TV

A satellite is like a radio transmitting tower 22,000 miles tall. From its lofty perch above the world, each communications spacecraft transmits signals that cover entire continents—and beyond.

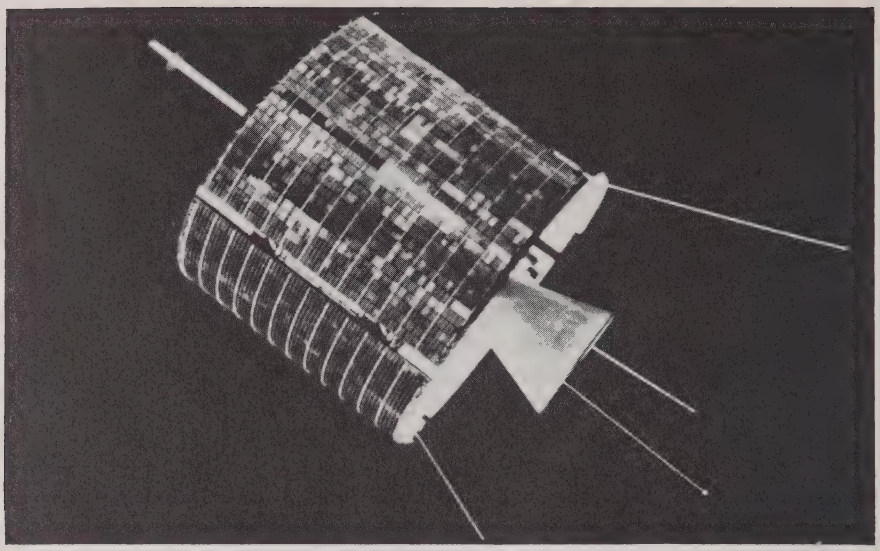
The idea of using man-made satellites for communications was first suggested at the close of World War II. In an article which appeared in *Wireless World* magazine, British mathematician and science-fiction writer Arthur C. Clarke outlined his visionary plan for a global satellite system. He postulated that if a satellite were a precise distance above the equator, its speed would perfectly match that of the earth's rotation. To earthbound observers, the satellite would seem to hang motionless at one particular spot in the sky. Clarke referred to these as *geostationary satellites* because they appeared to remain in a fixed position above the earth.

Mr. Clarke realized that a stationary satellite could blanket up to 40% of the earth's surface with television and radio signals, broadcasting to countless receiving stations within such an area. He suggested that a single satellite could replace hundreds or even thousands of local broadcasting stations at far less cost than any ground-based communications network of similar range.

Arthur C. Clarke



Although Mr. Clarke's article first appeared in the fall of 1945, his pioneering concept was considerably ahead of its time. It took the launch of Sputnik by the Soviet Union in 1957 to awaken the United States to the vast possibilities opening up in space. Many American achievements in computers, communications, and rocketry directly contributed to the development of communications satellites.



Early Bird, launched by INTELSAT in 1964.

Telstar and Early Bird

In 1962, NASA (the National Aeronautics and Space Administration) launched Telstar I, the world's first commercial communications satellite. Since the available rocket technology could only place Telstar into a relatively low orbit, it allowed communications between Europe and North America for only a few hours each day. Still, the tiny experimental satellite foretold the dramatic changes that were about to revolutionize planetary communications.

In 1964, INTELSAT (International Telecommunications Satellite Organization) was formed. One year later, INTELSAT launched its first commercial communications satellite, Early Bird, which provided some of the first exchanges of video programming between North America and Europe. Television broadcasting on Early Bird was the exception rather than the rule, since the satellite's single channel had to be completely cleared of all transatlantic telephone traffic for the duration of the video transmission. Other INTELSAT satellites soon followed Early Bird into orbit, fulfilling Arthur C. Clarke's vision of a global satellite network that could broadcast programming into every country on earth simultaneously.

The Intelsat Global Satellite Network

One of the first television broadcasts to be seen via satellite around the world was a program called "Our World," with entertainment from many countries around the globe. Great Britain's contribution originated from Abbey Road studios in London. In a live performance, the Beatles

sang "All You Need Is Love," a song especially composed for the occasion. This event drew a worldwide audience of 160 million people, an astonishing achievement at the time.

More recently, INTELSAT satellites have broadcast the inauguration of President Reagan, the marriage of Prince Charles and Lady Diana, and relayed sports tournaments like the Olympics and the World Cup Soccer games. Through the network of local television rebroadcasting systems, these satellite-delivered events have attracted audiences of up to two billion viewers worldwide. With 108 member countries, INTELSAT is an excellent example of how nations can work together to everyone's benefit.

The Beatles in an early live satellite broadcast.

Opening ceremonies of the 1984 Summer Olympics.

Satellites Over America

In the 1970's, both Canada and the United States developed satellites for communications within North America. Canada's first communications satellite lifted majestically off the pad at Cape Canaveral, Florida, on November 9th, 1972. The Canadian bird bore the name of ANIK, a word meaning "little brother" in the language of the Inuit Indian. By the end of 1972, the first ANIK satellite began linking remote locations throughout eight Canadian provinces and the Yukon and Northwest territories. The following year, the ANIK bird initiated satellite communications between Alaska and the continental United States.

Home Box Office and WTBS

In 1974, the United States launched its first communications satellites—Western Union's Westar I & II. Both the Westar and ANIK birds carried a dozen channels, quite an improvement over the single channel capacity of Early Bird. RCA entered the space communications business in 1975 with the launch of Satcom I, the world's first 24-channel satellite. Later that year, a pay TV service with a mere 57,000 subscribers startled the

cable TV industry by announcing that they would begin offering their service nationally via satellite. Home Box Office Inc. became the first satellite-delivered cable service on September 30, 1975, when they televised "The Thriller in Manila"—the world heavyweight championship fight between Muhammad Ali and Joe Frazier.

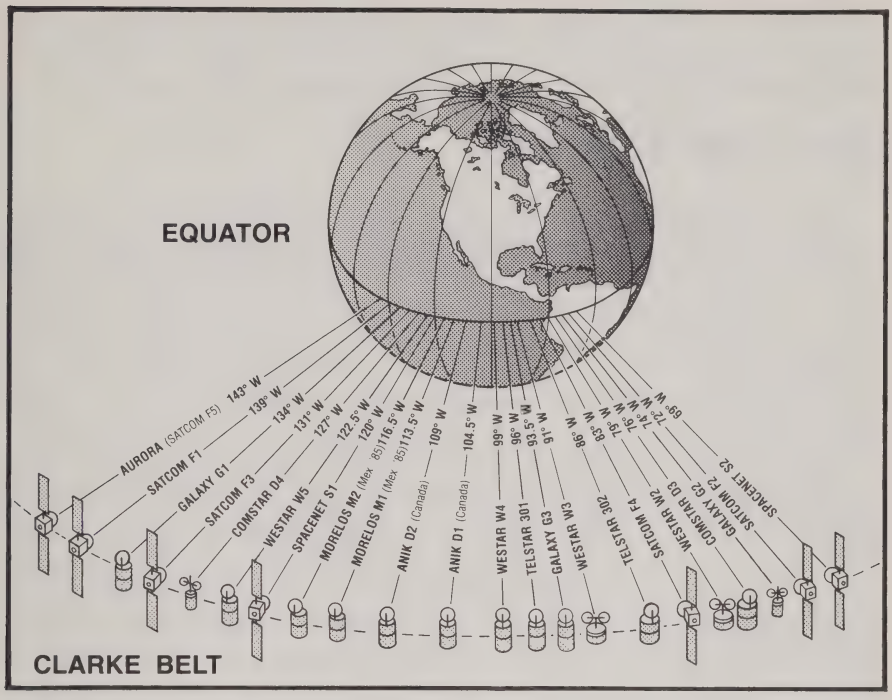
Soon after, other cable TV services caught the satellite bug. In 1976, Ted Turner, an independent TV station owner, began transmitting his Atlanta TV station via satellite to cable affiliates across the U.S. WTBS became cable's first Super Station. Turner was also granted an experimental earth station license by the FCC (Federal Communications Commission)making him one of the first individuals in the world to own a private satellite receiving terminal. By hauling his system around on a trailer, Turner was able to watch his Atlanta Braves play baseball in Georgia while he was in New England preparing for the America's Cup sailing races.

Early Satellite TV Pioneers

Other people became fascinated by the idea of receiving satellite TV in their own homes. A few experimenters on both sides of the Atlantic began creating clever electronic components that helped to lower the cost of picking up satellite signals. Others discovered ways to modify existing electronic equipment which allowed them to receive the early satellite transmissions of HBO, WTBS and others.

Unlike the early satellite TV pioneers who could patch together a home earth station for $10,000 or so, the FCC required the first licensed cable TV affiliates to spend a small fortune for their hardware; the first FCC regulations called for a minimum thirty foot dish. HBO's first few cable TV affiliates each spent hundreds of thousands of dollars to join the satellite network. In 1976, the FCC decided to allow cable companies to use dish antennas as small as 15 feet in diameter, which resulted in substantial cost reductions. Finally, in 1979, the FCC removed its requirement that all earth stations be licensed by the U.S. government, but the cost of an earth station still remained far beyond the reach of most mortals.

The rapid growth of cable TV caused manufacturers to begin the mass-production of commercial-grade satellite earth stations, which reduced the cost of many of the more sophisticated components. More and more people, many of them amateur radio enthusiasts with solid backgrounds in electronics, began tinkering with novel circuit designs in their basements and garages. A few of them started the first manufacturing companies to offer home earth station equipment to the public. Those first satellite receivers were quite primitive, like Edison's first phonograph compared to today's quadraphonic sound systems. While the early home satellite terminals were still relatively expensive and lacked many of today's fancier features, they attracted the attention of people throughout the world, especially those who were beyond the reach of cable.



Geostationary satellites over North America.

Satellite TV Today

During the past few years, the cost of satellite receiving systems has fallen dramatically. Home satellite terminals have evolved from a multitude of clumsy components to today's compact units with micro-circuitry and remote controls that allow the user to watch a veritable smorgasbord of video channels. A variety of financing packages place the satellite receiving terminal within reach of almost anyone.

Twenty U.S. and Canadian satellites now relay up to 130 channels of video for North America's broadcasting and cable TV networks. While more than 31 million homes in the United States now have access to cable, millions of homes in small towns or rural communities may never be reached. Satellite earth stations are now the only means for rural Americans to plug into cable TV services. Many urban and suburban residents are also turning to satellite television, since an earth station has access to many more program services than any cable TV system.

Sales of home earth stations during the past two years have far exceeded even the most optimistic projections of manufacturers and retailers. By the end of 1984 there will be almost 1,000,000 systems in place throughout North America, and this is really only the beginning. The cost of system components continues to fall rapidly. By the end of 1985, complete satellite earth stations may cost little more than today's

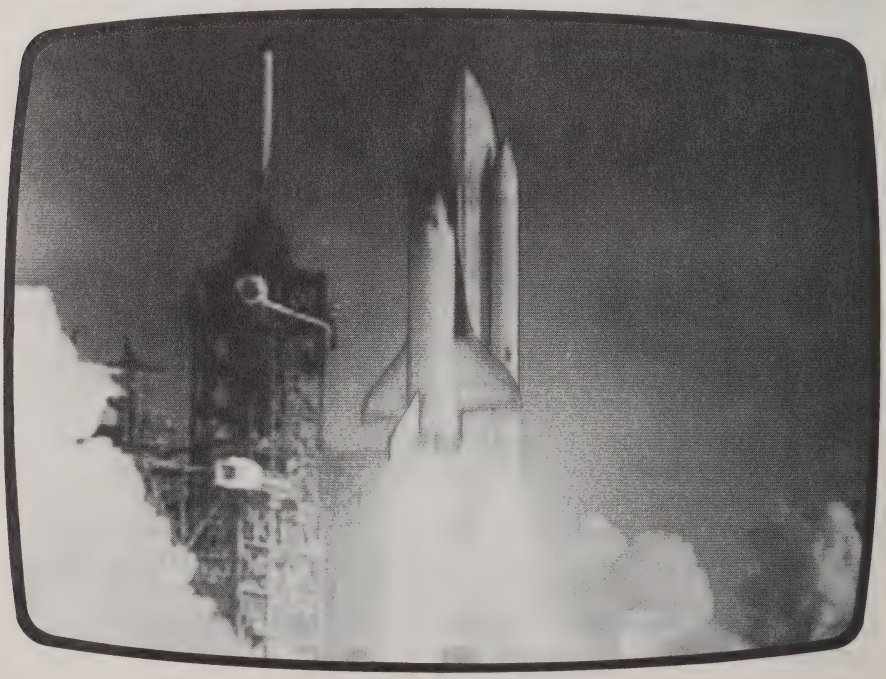
top-of-the-line video cassette recorders. Inevitably, this technology will sweep beyond North America, and become a vital source of information and entertainment for millions of people throughout the world.

How Legal Is It All?

The manufacture, sale and private non-commercial use of satellite receiving systems is unquestionably legal. A few cable TV corporations have denounced the unauthorized reception of satellite programs as signal piracy. Many others realize that millions of people without access to cable could best be served by satellite directly. The rapid evolution of satellite technology over the past twenty years is primarily due to the billions of U.S. tax dollars spent on the NASA space program, so many rural Americans justifiably feel they have a right to home satellite TV reception.

Congressman Albert Gore Jr. and Senator Barry Goldwater have guided legislation through Congress that formally establishes the viewing rights of satellite TV enthusiasts. Considering the high cost of producing programs, it is only right that the programmers receive adequate compensation for their efforts, so this legislation also upholds their rights to market this TV service. *Until a fair system of compensation has been arrived at, the free reception of satellite TV programs within your home is completely legal.*

The Space Shuttle carrying communications satellites into orbit.



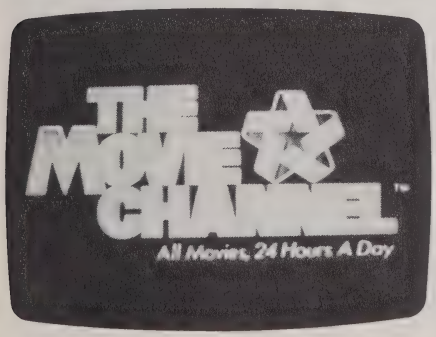
2 • Your Old TV Was Never Like This

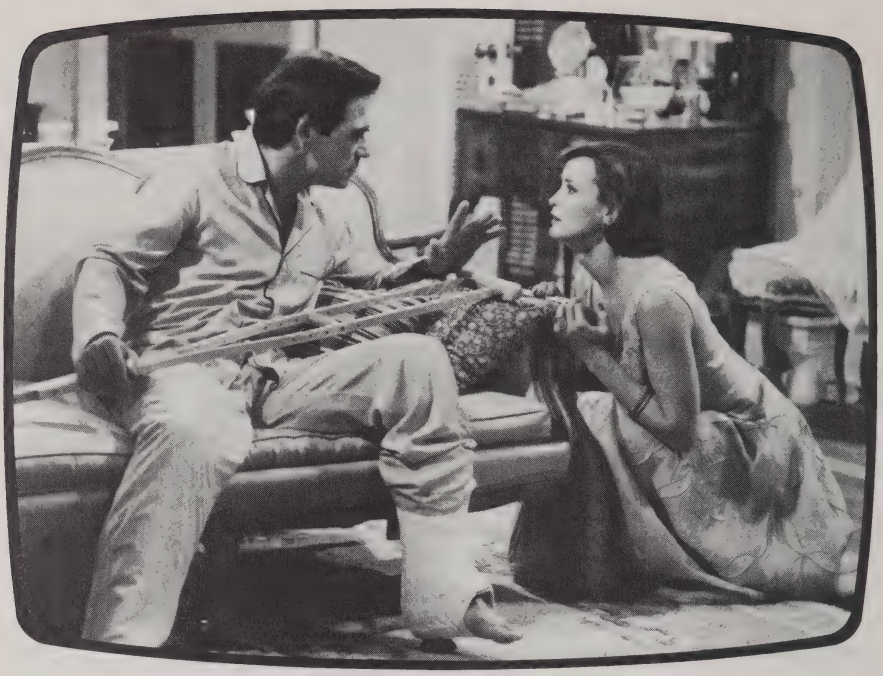
When people ask why I have invested in a satellite receiving system, I describe a typical evening's programming and they quickly sense what the satellite TV revolution is all about. As I cruise through the 24 channels that are available on the Satcom F3 satellite alone, I find one box office smash hit after another. Movies like *Close Encounters, Star Wars, Tootsie, Flashdance,* the *Rocky* and *Superman* movies, or critically-acclaimed films like *Sophie's Choice, Chariots of Fire, Norma Rae, Das Boot,* and *The Year of Living Dangerously,* I could go on for pages.

Or I dazzle them with major sporting events, including live professional and collegiate baseball and basketball games, NFL or USFL football matches, swimming and diving, or gymnastics competition; and music—from rock and roll concerts and music videos to symphony and opera—all in stereo sound. In between movies and other entertainment programs, we catch the hour's top news stories, interviews, comprehensive weather reports and TV coverage of the U.S. House of Representatives.

And if Satcom F3 isn't enough, I can aim my satellite antenna across the southern skies to receive more than a dozen other North American domestic satellites, each with its own programming. Compared to the pre-satellite era when we only had the three major networks and PBS to choose from, the complaint "There's nothing on tonight!" is rare at our house these days.

The Movie Channel © and Selec TV © are two of the premium movie services available.





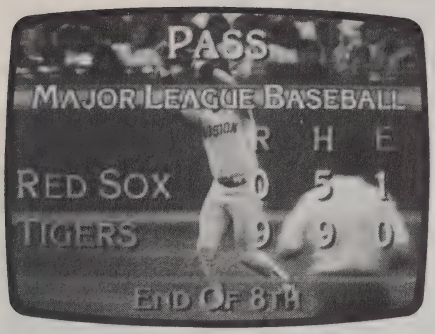
Jessica Lange and Tommy Lee Jones in *Cat on a Hot Tin Roof* presented by "Broadway on Showtime" (© Showtime/Trumbo).

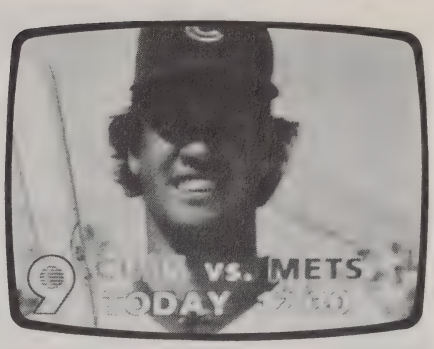
Hollywood Unchained

Some of the most attractive cable TV services available on satellite are the movie channels. They broadcast an unending stream of uncut feature movies with no commercial interruptions. While some services like The Movie Channel, Home Theater Network and Cinemax offer nothing but movies, others like Home Box Office, Showtime, SelecTV, and the Disney Channel offer a mixture of movies, entertainment specials, children's programs, sporting events and music concerts to their subscribers.

Sports Channels

In fact, most major sporting events at home and abroad are broadcast via satellites. ESPN (The Entertainment and Sports Programming Network) provides cable TV affiliates with 24 hours a day of NCAA collegiate baseball and football, USFL football, professional basketball and hockey. A variety of amateur and professional sports including gymnastics, boxing, track and field competitions, tennis, golf and wrestling are also available.



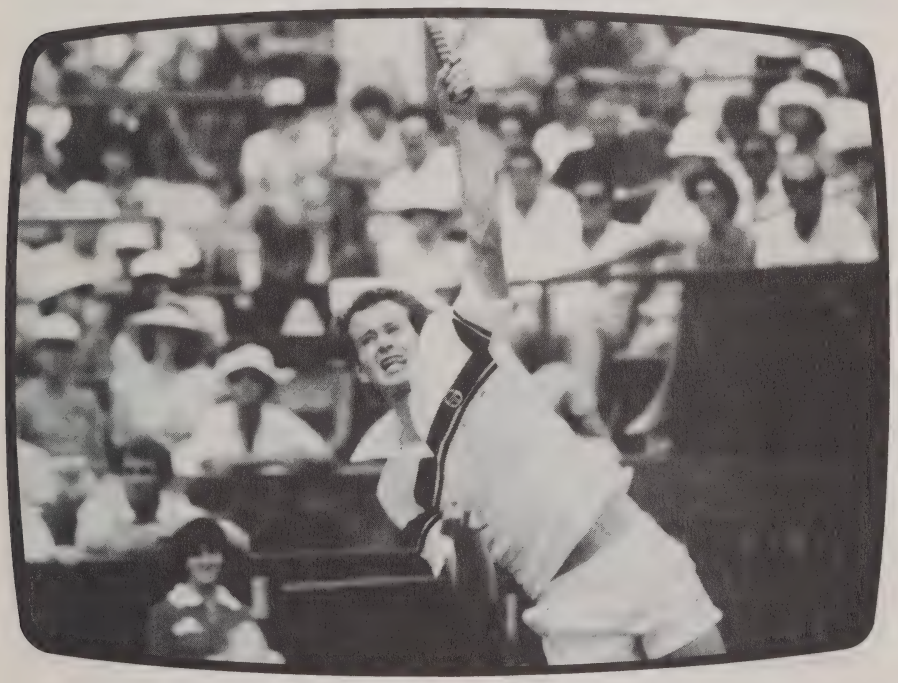


Major sports events are available from PASS (Pro Am Sports Service) and other channels dedicated to sports programming.

There are many other regional sports services which cover major-league sports events from around the country: Home Team Sports, Pro Am Sports, Home Sports Entertainment, Sportsvue, the New England Sports Network, Sports Time Cable Network, USA Cable Network, the Madison Square Garden Cable Network and Sports Vision.

ABC, NBC and CBS also use satellite channels extensively to relay major league sports events to their affiliated stations. During the spring and summer months, most major league baseball games are transmitted throughout the U.S. by satellite, as are most NFL and USFL football games.

John McEnroe in the Davis Cup Tennis finals broadcast live (© ESPN/Ross).

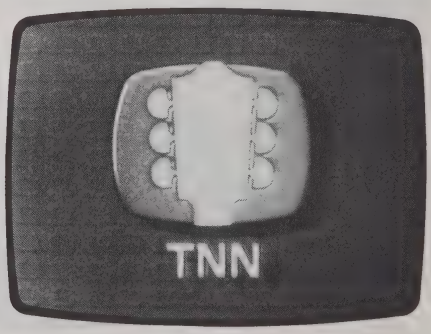


Willie Nelson performing on The Nashville Network (© 1984 TNN).

Adding a New Dimension to Music

The marriage of pop music with video technology has given birth to a number of satellite-delivered music channels. Combining music with a video story line adds an entirely new dimension to popular music. The most successful video music service to date is MTV (Music Television). MTV's star-spangled array of pop music programs includes interviews, taped concerts, *Closet Classics, The Friday Night Video Fights,* and special appearances by guest "vee-jays." To achieve the utmost in audio

MTV © offers 24-hour-a-day rock music videos, concerts. TNN © caters to country music fans.



reproduction, MTV broadcasts its musical selections in stereo sound. Those viewers who can't get enough of their favorite rock and roll videos can also tune into daily video music segments on the Satellite Program Network. Video music flicks also air continually via the Canadian music channel, *Much Music*. On weekends the USA Network's rock extravaganza, *NightFlight*, offers live concerts along with top video music productions. Taped rock concerts as well as pop video shorts can also make their appearance on HBO, Showtime, and Cinemax.

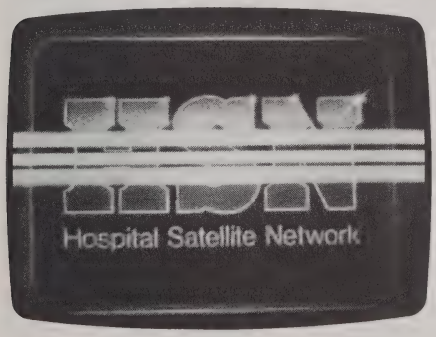
If country music is what turns you on, TNN (The Nashville Network) regularly broadcasts concerts from the hallowed halls of the Grand Ole Opry in Nashville, Tennessee. Other country/western music performances appear on many of the other segments of TNN's daily schedule, including *Nashville After Hours,* and *Off the Record Rack*. If you would prefer a country/western version of MTV's rock video format then CMT (Country Music Television) is for you. Both CMT and TNN broadcast in stereo.

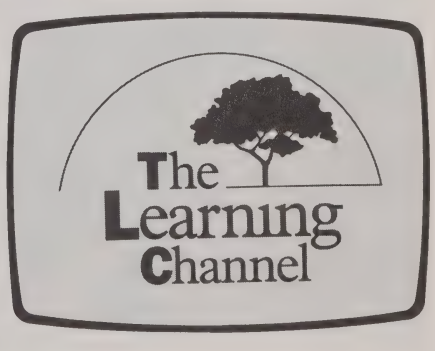
Educate Yourself by Satellite

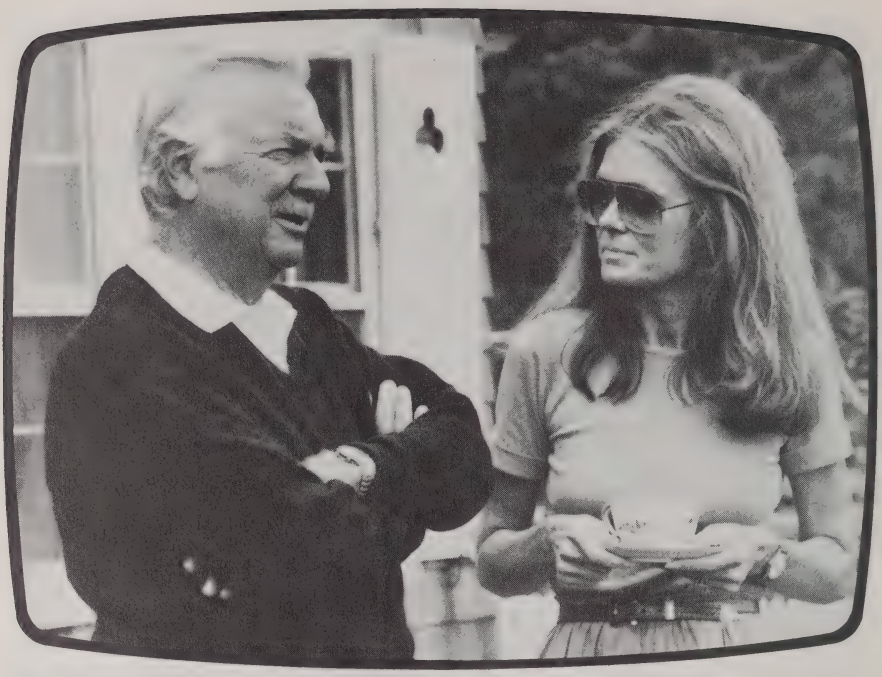
Satellite television also provides unique opportunities for adult education. The Learning Channel is a satellite-delivered service that airs ten hours of adult education a day, including many college-credit courses. The Learning Channel will also be of interest to young professionals seeking to improve their career skills. Lifetime presents a consumer's guide to health, with programs on exercise, diet, human sexuality, health news, and tips on health-maintenance for the weekend athlete. The Learn/Alaska television network provides instructional programs for the rural Alaskan community.

Home earth stations can also pick up the four satellite channels owned by PBS (Public Broadcasting Service). PBS uses these channels to relay educational programs to PBS affiliates throughout the United States.

HSN © provides instructional programming for the medical profession (©1984 HSN). The Learning Channel © offers educational material for all ages.







Walter Cronkite and Gloria Steinem appearing on Lifetime (©1984).

The PBS affiliates also use the satellite network to exchange locally-produced programs with other PBS stations outside their area.

There are also satellite channels devoted to various aspects of health care. HSN (The Hospital Satellite Network) is a round-the-clock program service for hospitals nationwide. In the evenings, HSN features premium movies for patients; at other times of the day HSN offers instructional programs for members of the medical profession. HSC-TV is a medical training channel for the U.S. Army, broadcast from the Brooke Army Medical Center in San Antonio, Texas. HSC-TV regularly transmits video tapes demonstrating new operating techniques and procedures to the Army's medical staff.

All the News and Then Some

If you're after the latest news from all over, the home earth station is for you. News organizations have found satellite broadcasting to be indispensable, since it allows camera crews in the field a fast way to deliver stories to the networks as they unfold. Satellites are also used to deliver full-time cable news services to cable TV companies across North America. Your home system can pick up all these transmissions, often the moment they occur.

Both the Cable News Network and CNN Headline News are available by satellite from Turner Broadcasting ©.

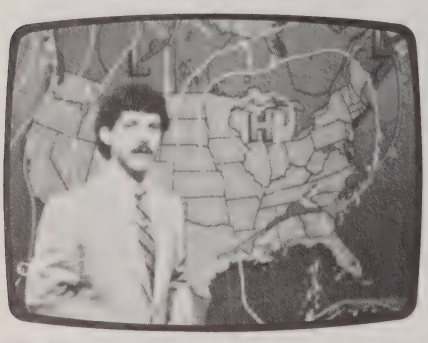
Ted Turner's CNN (Cable News Network) offers in-depth news coverage 24 hours a day, with special reports on a variety of subjects, including international news, economic developments, and sporting events. CNN also conducts interviews with the people who make the news headlines, and it has played a major role in providing viewers with detailed election-year campaign coverage of the candidates and their campaigns.

CNN Headline News is Turner Broadcasting's second cable news channel, one that gives brief reports on major news events as they occur. CNN Headline News has a continually changing, fast-paced format that allows viewers to tune in around the clock to receive a summary of the day's major news stories.

Ted Turner, Chairman of the Board and President of Turner Broadcasting System.

FNN (Financial News Network) provides a daily news service for the interested businessman with extensive financial reporting and Dow Jones updates. The Reuters news retrieval service gives instantaneous access to activities on the New York Stock Exchange as well as commodities and futures listings that are valuable to anyone involved in day-to-day business transactions. Access to Reuters does require subscription and lease fees, and a special decoder that allows your satellite receiver to display the various services that Reuter's has to offer.

The Weather Channel provides instantaneous access to national and regional weather information in greater depth than can be obtained from any other source. Weather information is updated periodically so that viewers can become aware of developments as they occur.

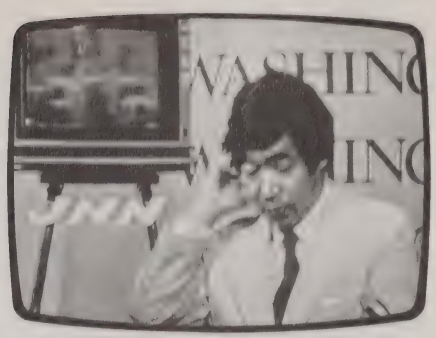


The Weather Channel ©® always has the latest local and national forecasts. C-SPAN offers coverage of The House of Representatives.

C-SPAN (The Cable Satellite Public Affairs Network) is a 24-hour-a-day service based in Washington, D.C. C-SPAN covers the activities of the U.S. House of Representatives, including live gavel-to-gavel coverage of activities on the floor of the House, major subcommittee meetings, Congressional press conferences, and other related events. During 1984, C-SPAN has provided some of the most in-depth coverage of the Democratic primaries and caucuses, including viewer call-in programs from the primary states. C-SPAN also offered taped coverage of political campaign speeches given by the major candidates, along with televised debates, which gave viewers outside the primary states a good look at the candidates. C-SPAN also provided full coverage of the Democratic and Republican conventions, programming that is no longer offered by the major broadcasting networks.

For Canadians, live coverage of the Canadian House of Parliament in both English and French is transmitted daily via an ANIK satellite.

AFRTS (The Armed Forces Radio and Television Service) is the creation of the U.S. Department of Defense. AFRTS beams a variety of news and sports programs to American military personnel stationed at overseas locations. The AFRTS programming broadcast day consists of a blend of ABC, NBC and CBS news programs as well as several hours of Ted



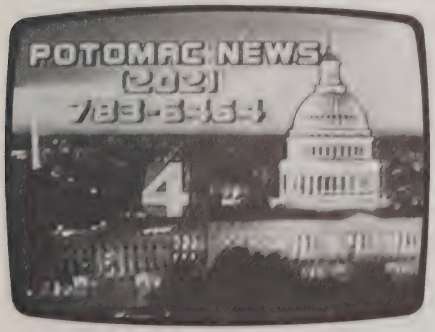
ABC satellite feed to New York. JNN sends news coverage from Washington, D.C., to Tokyo.

Turner's CNN. Satellite TV viewers will find that many of their favorite investigative news and interview programs are aired on a tape-delayed basis.

For the international news buff, satellite channels supply numerous news stories from abroad. Our major broadcasting networks can give global events only a small portion of each evening's 30-minute news broadcast; even CNN can only choose a few foreign stories from the many that are available. But there are several satellite channels that deliver news reports from Europe on a regular basis. By tuning in to the UPITN or Brightstar channels on satellite, the home satellite TV enthusiast can receive news reports from overseas news departments before they are edited—or perhaps even rejected—by major news bureaus here at home.

Important news events can be seen live via satellite as they occur. Even NASA has a satellite channel which allows the home TVRO viewer to tune into live space shuttle missions. Why wait for the evening news coverage when you can have immediate access to the complete and unedited coverage of major world events? You will also find many satellite channels that are used at irregular intervals to link news reporters in the field with their main studios. You can see raw, unedited news coverage filed by your favorite correspondents. You can even watch them rehearsing their lines as they wait for their cues from the network studios.

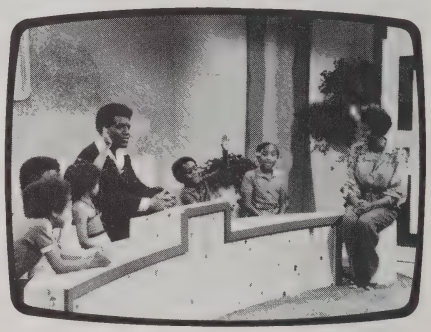
Potomac News ©, and Wold Communications Vis News ©.



Let Them Entertain You

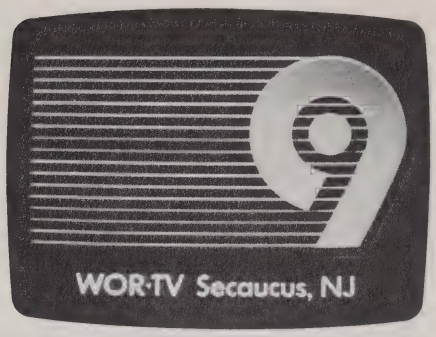
Many channels carry a variety of entertainment programs for the entire family. Program services like the USA Network, MSN (Modern Satellite Network), and SPN (Satellite Program Network), provide a wide range of entertainment, including children's programs, sporting events, phone-in shopping auctions, concerts and rock videos, theater, and foreign television programs. They also show reruns of many of your favorite TV programs from the past like *MASH, All in the Family, Soap, The Mary Tyler Moore Show, The Best of Groucho,* and many others. Other entertainment networks supply programming of ethnic or cultural interest to particular groups. Services like BET (Black Entertainment Television) have a variety of features for America's black community. The Arts and Entertainment network specializes in cultural programs of the performing arts, such as ballet, modern dance, theater, opera, Broadway plays, and selections from the British Broadcasting Corporation.

USA Network © has a variety of entertainment. *Nipsey Russell's Juvenile Jury* is featured on BET ©.



The Great Super Stations

A Super Station is an independent television station that is broadcast via satellite to cable TV systems across North America. WTBS-Atlanta, WGN-Chicago, WPIX-New York, and WOR-New York are available on a full-time basis via satellite. These "Super Stations" provide satellite dish owners across the country with the same television programs watched by viewers who live in the major super station metropolitan areas. This includes many sports events involving major league teams in these areas, as well as local and regional news coverage. The Super Stations also carry a full slate of movies, sitcoms, documentaries, and entertainment features, many which have been especially developed by the stations themselves. Dish owners who subscribe to CANCOM (Canadian Communications



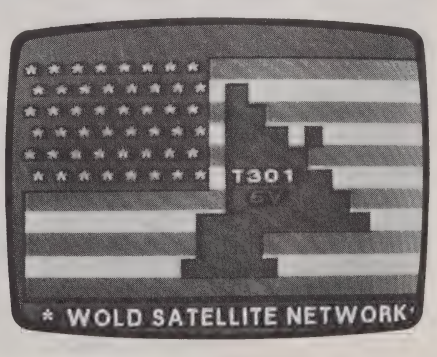
Superstations WTBS, © Atlanta, Ga. and WOR-TV, © Secaucus, N.J.

Company) are provided with a descrambler that will give them access to several additional Canadian Super Stations from Montreal, Vancouver, Hamilton, and Edmonton. In addition, they receive programming from three major Detroit TV stations.

All the Usual Network Fare

All of the major American television networks are using the birds to deliver their prime-time programs to affiliate stations throughout the U.S. For rural Americans who live beyond the primary coverage areas of network-affiliated stations, satellite TV provides the best means for obtaining clear reception of evening network programming. CBC (The Canadian Broadcasting Company) and PBS also use satellites to relay their program lineups to their North American affiliates. Wold Communications uses satellites to supply independently-produced programs like *Fame, Entertainment Tonite* and the *Merv Griffin Show* to more than 70 independent TV stations nationwide.

Satellite relay of NBC's Hill Street Blues ©. Wold Communications © test card.



The Disney Channel presents 19 hours-a-day of family entertainment (©1984 Walt Disney Productions).

There's Lots for the Tots

Several satellite channels are primarily devoted to entertaining and/or educating young people. Perhaps the best-known station is Nickelodeon which features intelligent and innovative entertainment created by young people for young people: music and videos, science fiction serials, interviews and educational programs. The Disney Channel offers the Disney library of animated cartoons, movies and features, as well as an educational series that explores the possibilities of the future. Services like

Beauty and the Beast on Shelley Duvall's *Faerie Tale Theatre* presented by Showtime (©1984 Showtime/Houston).

Showtime, the USA Network and Home Box Office also have features especially geared for younger audiences.

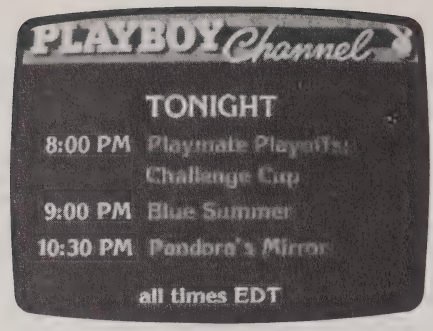
GIMME THAT OLD TIME RELIGION

Religious organizations throughout North America now spread their gospel via satellite. Program services like NCN (National Christian Network), PTL (Praise the Lord) and the TBN (Trinity Broadcasting Network) beam sermons and inspirational programming into millions of homes. Other Christian program services include CBN (Continental Broadcast Network) and ACTS (American Christian Television Service). These networks combine their spiritual message with a selection of family entertainment programs, many of them reruns of former prime-time favorites from the major broadcasting networks. For the Jewish community, NJT (National Jewish Television) puts forth a selection of religious and educational programs.

Other religious organizations are actively using satellite communications to reach their congregations. Even the Maharishi Mahesh Yogi has regular seminars with his students via satellite; you can chant mantras with him courtesy of Western Union's Westar IV spacecraft.

Erotic Entertainment

You'll find many satellite channels devoted to sexually explicit programming. The selection of late night porn, soft and hard, ranges from the titillating program fare of the Playboy Channel to the hard-core, X, XX and triple X-rated, offerings of the Fantasy and Pleasure Channels. Since some X-rated services are scrambled, you will need to lease a decoder and pay a monthly subscription fee to watch them. Mainstream movie services like SelecTV and Cinemax also air late-night "adult programming" on a regular basis. If you have kids, you can purchase equipment that allows you to lock out such channels when you want.

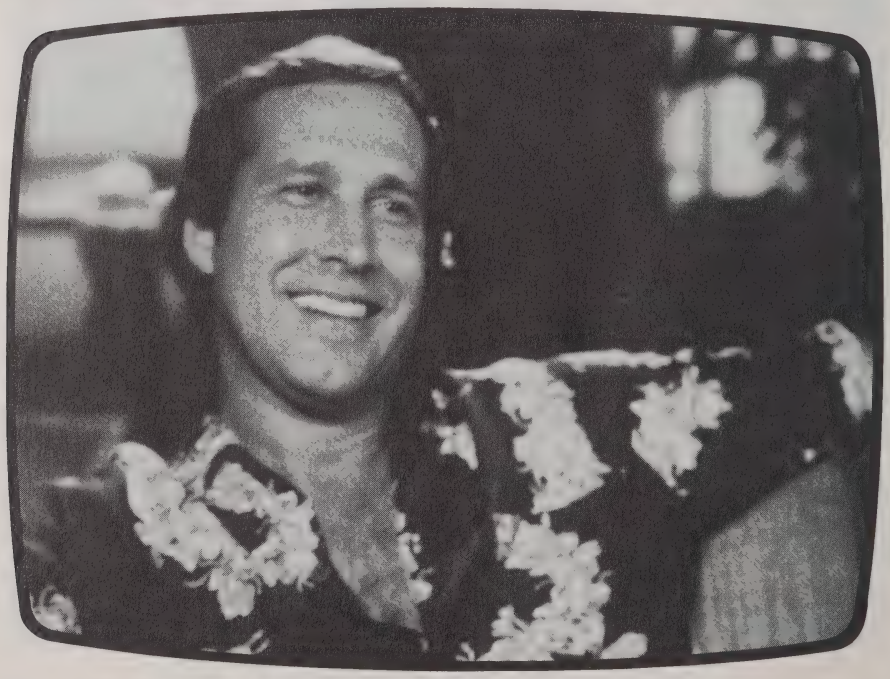


The Playboy Channel offers adult entertainment (©1984 Rainbow Programming Services). Fantasy broadcasts scrambled X-rated movies; a decoder is required for viewing.

For the Multi-Lingual

SIN (Spanish Independent Network) is a Spanish-language television service with programs from Latin America. Much of the program day is directly obtained from XEW-TV, Mexico City's Channel 2. Programming includes soaps, movies, sitcoms and game shows, along with coverage of major international news and sporting events. Galavision is a Spanish-language cultural program service, which offers a variety of features

Comedian Chevy Chase during an interview for the Playboy Channel ©.



Mexican TV; also available are European broadcasts such as this East German news.

including films, theater, musical performances and novellas. French-language television can be found in abundance on the Canadian Anik satellites.

The French edition of CBC North as well as TCTV from Quebec are available on a regular basis. Live coverage of the Canadian House of Parliament is also relayed in French via Canadian satellite.

There's plenty of overseas television being carried by international satellites. Dishes in the eastern half of North America can pick up TV channels from Caracas, Rio de Janeiro, Moscow, Mexico City, Buenos Aires, Lima, Bogota, and Santiago. Reception of these international satellite services requires specially-adapted earth station hardware.

Satellite Radio Stations Too!

Home earth station owners not only have access to more than 150 channels of television, but also to over 60 FM radio stations from across the United States and Canada, many in stereo. You can get just about any music format imaginable, including rock and roll, country/western, rhythm and blues, classical music, easy-listening and even 24-hour jazz. Other radio stations primarily feature news, sports, and financial services, entertainment or religious instruction.

With All This Programming, How Can You Ever Decide What to Watch?

Most newspapers offer program listings for many of the cable TV services currently transmitted via satellite; TV Guide also carries a complete listing of cable TV services. Several magazines are entirely devoted to supplying an hour-by-hour guide to most of the satellite TV channels. Subscribing to any of these publications will keep you up to date on what's happening in the fast-changing world of satellite TV.

Complete Program Grid [as of Nov. 1st, 1984]

	SATCOM F2 72 W.	GALAXY G2 74 W.	COMSTAR D1-2 76 W.	WESTAR W2 79 W.	SATCOM F4 83 W.	COMSTAR D3 87 W.	WESTAR W3 91 W.	TELSTAR 301 96 W.	WESTAR W4 99 W.
1					o/v Sports	o/v News, Sports			
2					BRAVO (S)			CBS N.Y.	
3				o/v CBS News Sports	SPN (S)				
4					HSE			o/v News, Sports	o/v News, Sports
5							o/v CNN		o/v News, Sports
6					o/v Sports			o/v News	o/v News, Sports
7					NCN/ PLN				
8									
9					SPORTS-VISION			WOLD Comm.	
10						CBS H-TV		ABC N.Y.	o/v News, Sports
11				o/v CBS News Sports	HSE			o/v News, Sports	o/v News, Sports
12	o/v Sports				PLAYBOY			ABC L.A.	
13					New England Sports				
14					o/v Sports				
15					BIZNET (X)	o/v News, Sports			PBS
16					o/v News				o/v CNN News
17		o/v Sports			TBN	CBS L.A.	o/v News, Sports	o/v News, Sports	PBS
18								o/v News, Sports	o/v ABC News Sports
19				o/v CBS News Sports	WPIX N.Y.	o/v News, Sports	o/v News, Sports	o/v News, Sports	o/v Sports
20	AFRTS				o/v Sports			o/v News, Sports	o/v ABC News Sports
21					KTVT Dallas		o/v News, Sports		PBS
22					o/v Sports				
23					SFC		o/v News, Sports	WOLD Comm.	PBS
24								o/v News, Sports	

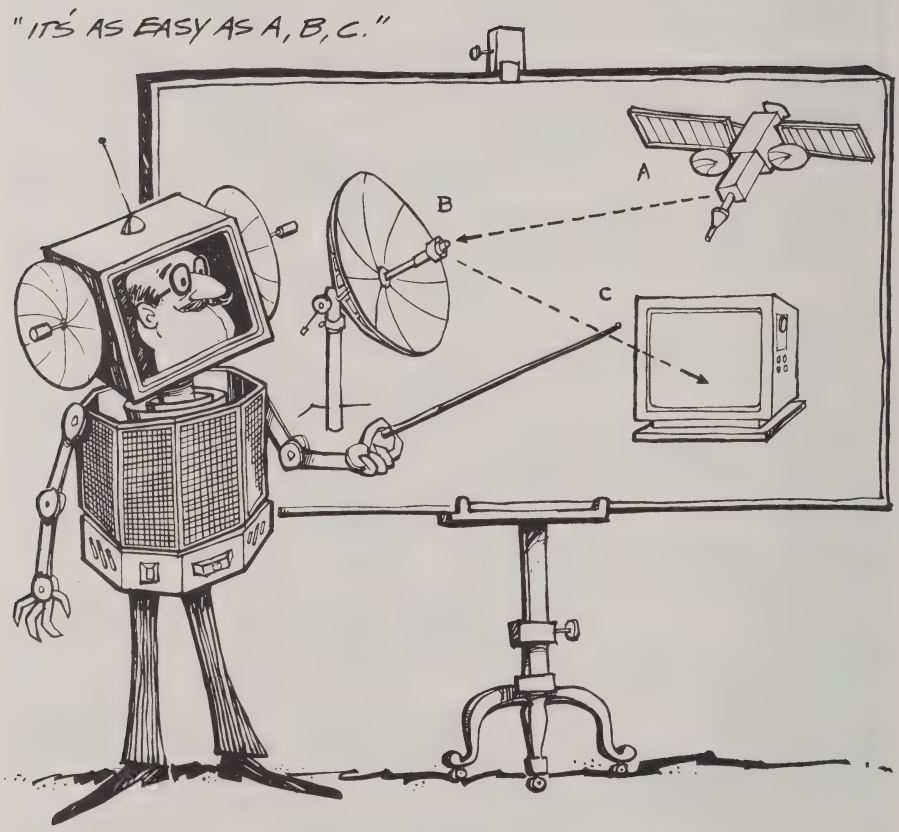
O/V = Occasional video . [S] = Stereo [X] = Scrambled

Horizontal polarization **Vertical polarization**

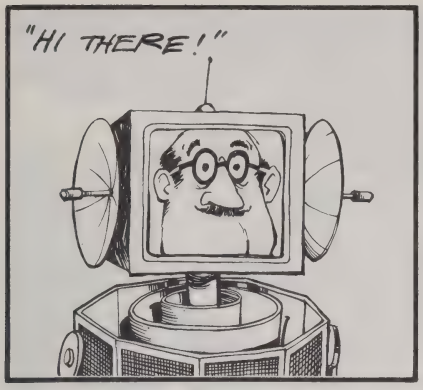
	ANIK D1 104.5 W.	ANIK B1 109 W.	SPACENET S1 121 W.	WESTAR W5 123 W.	COMSTAR D4 127 W.	SATCOM F3 131 W.	GALAXY G1 134 W.	SATCOM F1 139 W.	AURORA F5 143 W.
1			Baptist TV (X) Network	Penn. St. Horse Race (X)		Nickel-odeon			
2	o/v Sports			The Unchannel		PTL (S)	TNN (S)		
3				o/v News, Sports		WGN Chicago	HBO (X)		
4	Global					FNN + Sports-time	DISNEY (E)		
5	o/v Sports			JISO		Movie Channel (E) (S)	Showtime (E)		
6	Much Music (S)						SIN		
7	EHQ 1	o/v CBC News Sports		o/v CBS H-TV		ESPN (S)	CNN		
8	CHCH (X) Hamilton			Sports-vue	ON-TV (S) (X)	CBN	Music Video Net	NBC	
9	WDIV Detroit (X)					USA	ESPN (S)		
10						Showtime (W)	Movie Channel (S) (E)		
11	CBC NORTH (W)	CBC NORTH (W)	HSN	o/v Group W		MTV (S)	CBN		
12						Showtime (E)	HTS	FNN	
13	o/v CBC Sports	o/v CBC News Sports			SelecTV	HBO (W)	C-SPAN		NASA
14	TCTV (X) Quebec			PASS Sports		CNN	Movie Channel (W) (S)		
15	CBC-French	CBC-French	ACTS	o/v News, Sports		CNN Headline	WOR-TV		
16	CBC NORTH			o/v News, Sports		HTN-Learning Channel			
17		o/v CBC News Sports		TNN (S)		Lifetime	Black Entertain TV (S)		
18	CITV (X) Edmonton			o/v Sports	Country Music TV (S)	Reuter, EWTN	WTBS Atlanta		
19	CBC (E) NORTH	CBC NORTH				C-SPAN	CINEMAX (E)		
20	CBMT Montreal			Hi-Life Network	Playboy Channel	CINEMAX (E)	Gala-vision	AFRTS	Learn Alaska
21	WTVS (X) Detroit	o/v CBC News Sports		o/v Sports		Weather Channel			
22	BCTV (X) Vancouver			Pleasure Channel (X)	ON-TV (S) (X)	o/v Sports		o/v	
23	WJBK (X) Detroit	o/v CBC News Sports		ARTS (S)		CINEMAX (W)	HBO (E)		
24	CBC NORTH			FANTASY (X)		HBO (E)	DISNEY (W)		Alaska TV Project

[E] = East coast feed [W] = West coast feed

3 • The Hitchhiker's Guide to the Satellites



Introducing Professor Orbiter, the only known being capable of traveling at the speed of light; able to jump from satellite to satellite at will. He will conduct us on a guided tour of the birds. Let's hitch a ride with him right now...

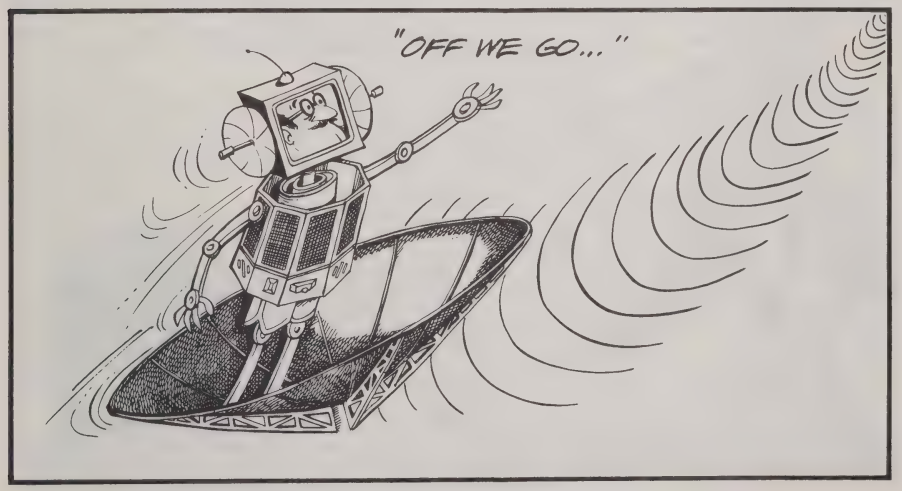


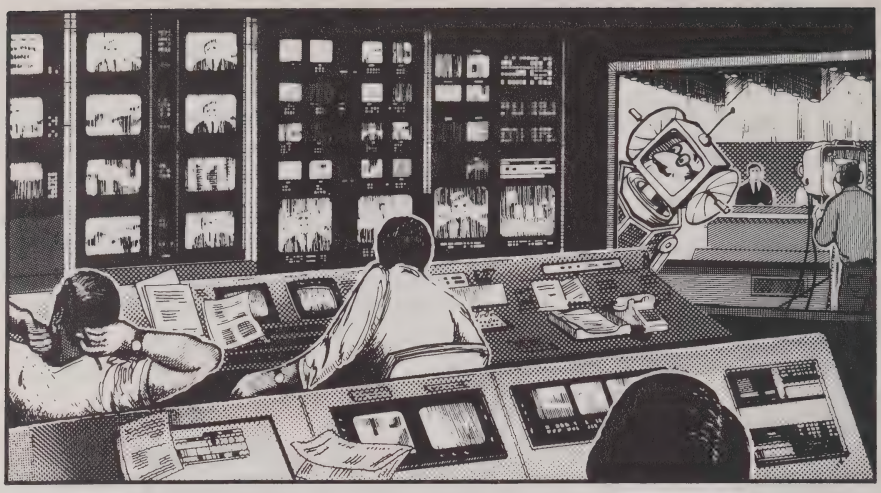
"Professor Orbiter here. Now that we know what's available via satellite, let's look at just how North America's satellite network operates. This will make it easier for you to locate and receive the entire spectrum of available satellite TV programming on your set.

It All Starts at the Studio

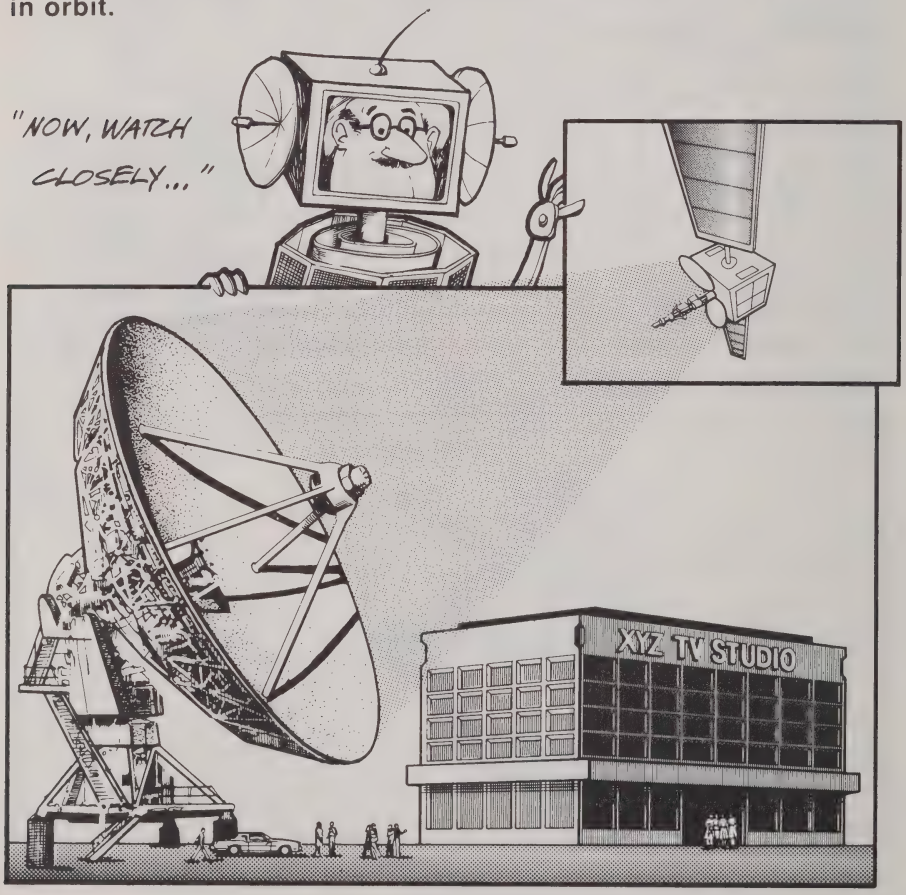
Because the major studio is the gateway to America's celestial communications grid, that's where we'll start. Here the images and sounds of live performances are captured by video cameras and microphones for broadcast live, or on tape for later use. Whatever their source, each program's video and audio signals are sent to a high-powered transmitter that generates super high frequencies—electromagnetic waves that vibrate billions of times per second. Aimed at the orbiting satellite, these "micro" waves pierce through the earth's electrically-charged atmosphere and are received by the satellite.

These electromagnetic waves of energy travel at the speed of light. Let me free you from the relatively limited confines of your earthbound existence and take you on a ride out to the infinite expanses of space. It will give us a totally new perspective on how satellite technology works. Let's catch the next wave—our vehicle for cruising the satellite superhighways— and begin our journey.



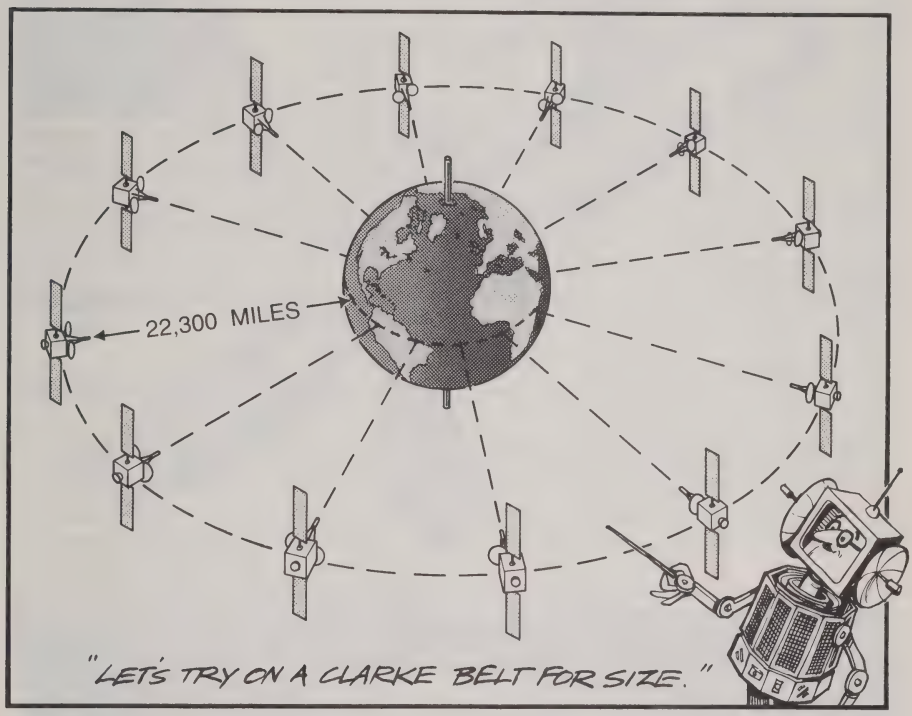


A giant dish at the television studio beams a signal up to a satellite in orbit.



Uplinks, or Getting There is Half the Fun

An extremely large dish, called an uplink antenna, is used to connect the cable TV studio with a particular satellite. Like a giant searchlight sending powerful beams of light into the evening skies, the uplink antenna concentrates the outgoing radio waves and radiates them in the direction of the satellite, creating an invisible communications pathway.



More on the Geostationary Orbit

The relationship between an orbiting satellite and the earth is like that of the rim of a wheel and its hub. The satellites are located at the end of the spokes of the wheel, the earth is at the hub. With the rim, spokes and hub all continually moving, at the same speed, their relationship remains unchanged. Today this narrow band of space-age "real estate" is called the "Clarke Belt" in honor of the man who first saw how artificial satellites could revolutionize world-wide communications.
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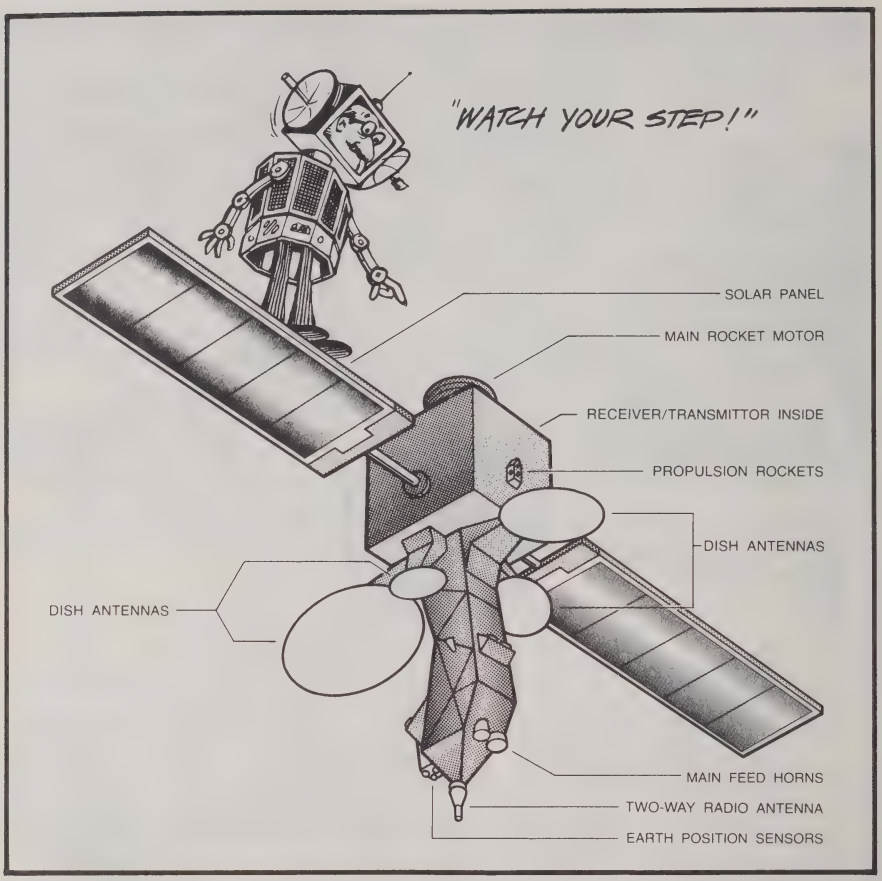


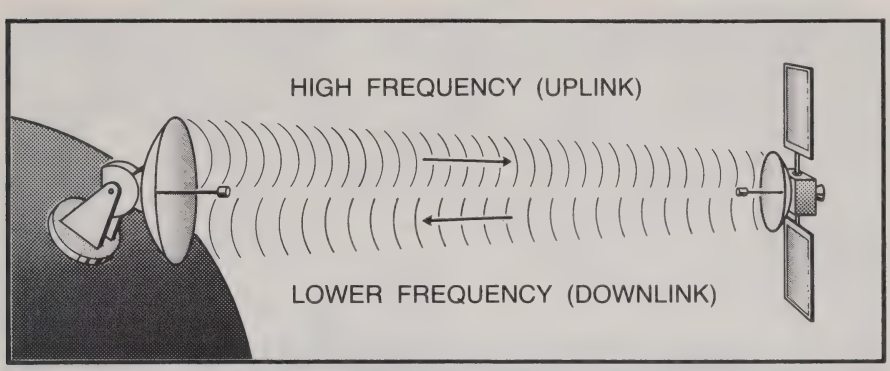
The major parts of a typical communications satellite.

Bird's Eye View

A satellite is a self-sufficient spacecraft built to withstand the harsh environment of outer space. There are two basic types of satellites. The kind we're about to visit has large wings covered with a mosaic of rectangular blue wafers of silicon which generate electricity from the sun. These wings rotate slowly, so they're always facing the sun. For the best view, I would suggest that we stand out here on one of the satellite's wings. Watch your step, though. It's a long way down!

Satellites use two sets of frequencies, for the same reason that we have divided highways: if we drove our vehicles in both directions in the same lane, there would be some real problems. The separation between incoming and outgoing signals prevents unwanted interference between the two.

So one frequency is used to send TV programs up to the satellite. The satellite's dish antenna captures the incoming signals and passes them



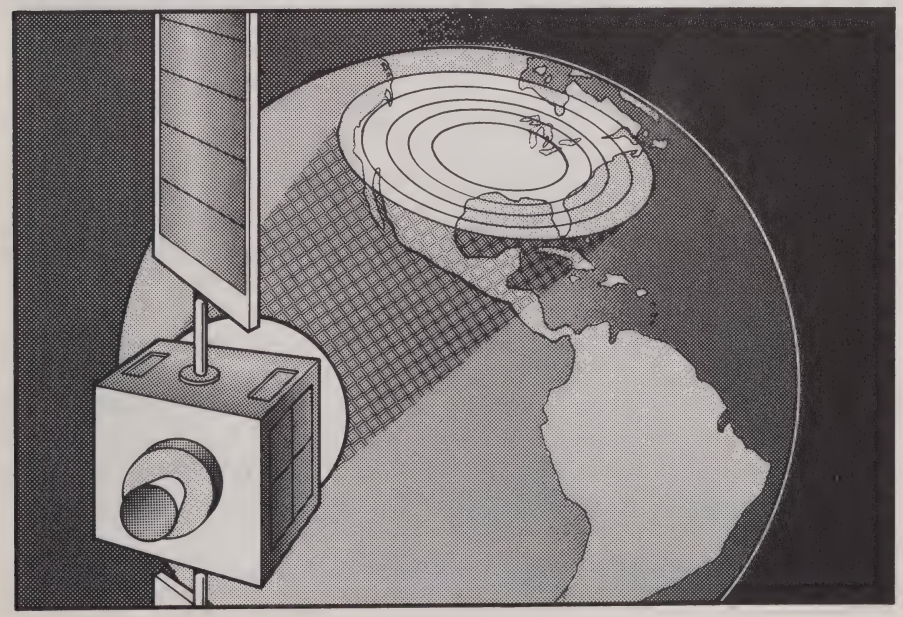
Two-way communication between the earth and a satellite is accomplished by using two different frequencies.

along to a receiver tucked away in the center of the satellite. The receiver processes all 24 channels of video programming and transfers them to the satellite's transmitter. Using a slightly lower frequency, the satellite's transmitter relays the TV signals back to earth via the satellite's dish antenna.

Satellite Footprints

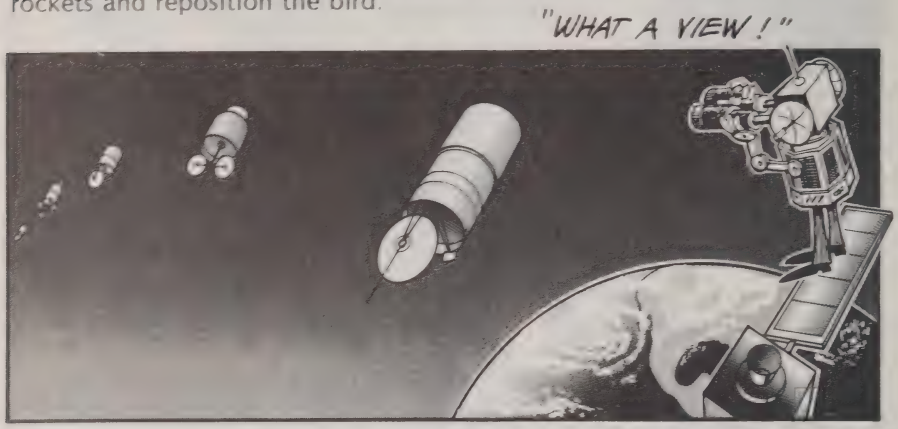
The satellite antenna transmits the television signals in a particular pattern — called a footprint — which covers a substantial area of the earth's surface. The signals are strongest at the center of each satellite's footprint, decreasing to fainter levels out toward the edge. Earth stations located at

A satellite beams its signal to earth in a characteristic "footprint."



the fringe of the footprint will need larger dish antennas to receive the signals than those at the center.

Communications satellites also carry equipment like batteries for storing the electricity generated by the solar cells, tiny propulsion rockets for maneuvering the bird, and a two-way radio circuit that supplies a constant stream of information between the satellite and the engineers controlling the satellite from the ground. If the engineers don't like how the spacecraft is flying, they can send up command signals that fire the rockets and reposition the bird.



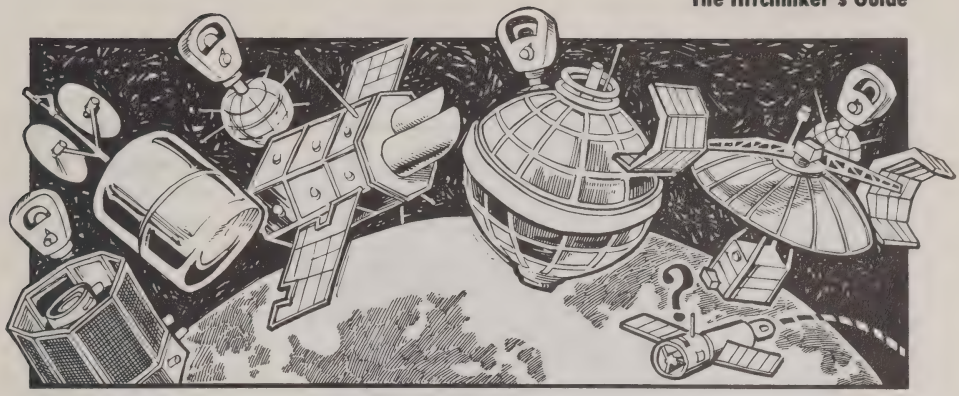
Now look: just over to the west of us—a mere few hundred miles away—is a second type of satellite. It's cylindrical in shape, sort of like a giant trash can with a pop top lid. The lid is actually a dish antenna. The exterior of this satellite is almost entirely covered by a cluster of energy-producing solar cells, and the body of the satellite spins like a top, so that the solar cells are continuously illuminated by the sun.

Parking Problems

Now take a look—a thousand miles or more in either direction. You can see satellite after satellite after satellite. The skies over North America are quite full, so full in fact that the FCC recently changed the satellite parking rules, requiring that existing birds be positioned closer together, so that future occupants of the Clarke Belt will have enough room.

To create even more parking spaces, some satellite manufacturers are making satellites that operate on new channels, higher in frequency than those now used. The situation is reminiscent of television in the 1950's: when channels 2 through 13 got crowded—especially in urban areas—additional UHF channels, at higher frequencies, were made available to ease the congestion.

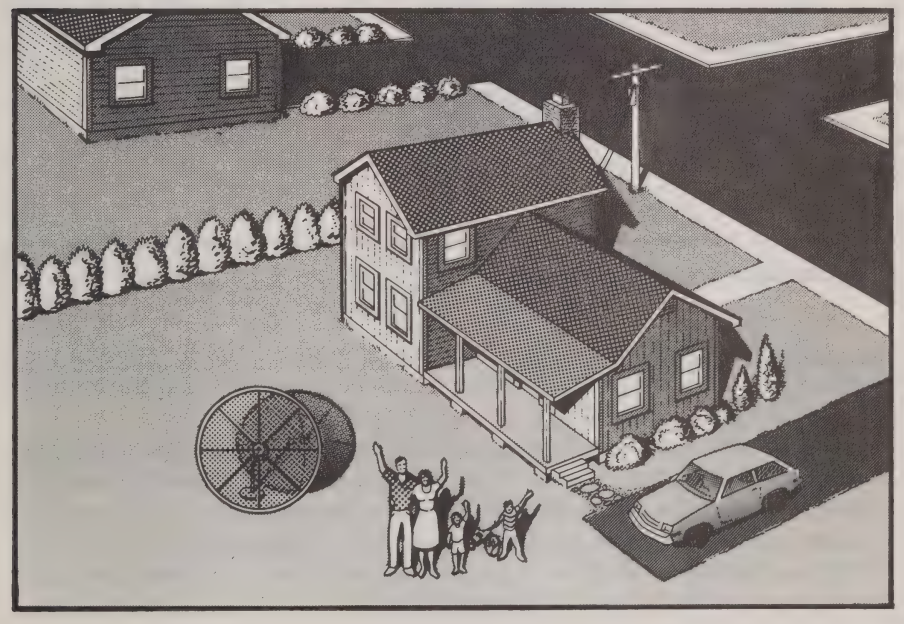
Well, I guess it's time to head back down to spaceship Earth. While we came up on one set of waves, we'll need to catch another frequency for the

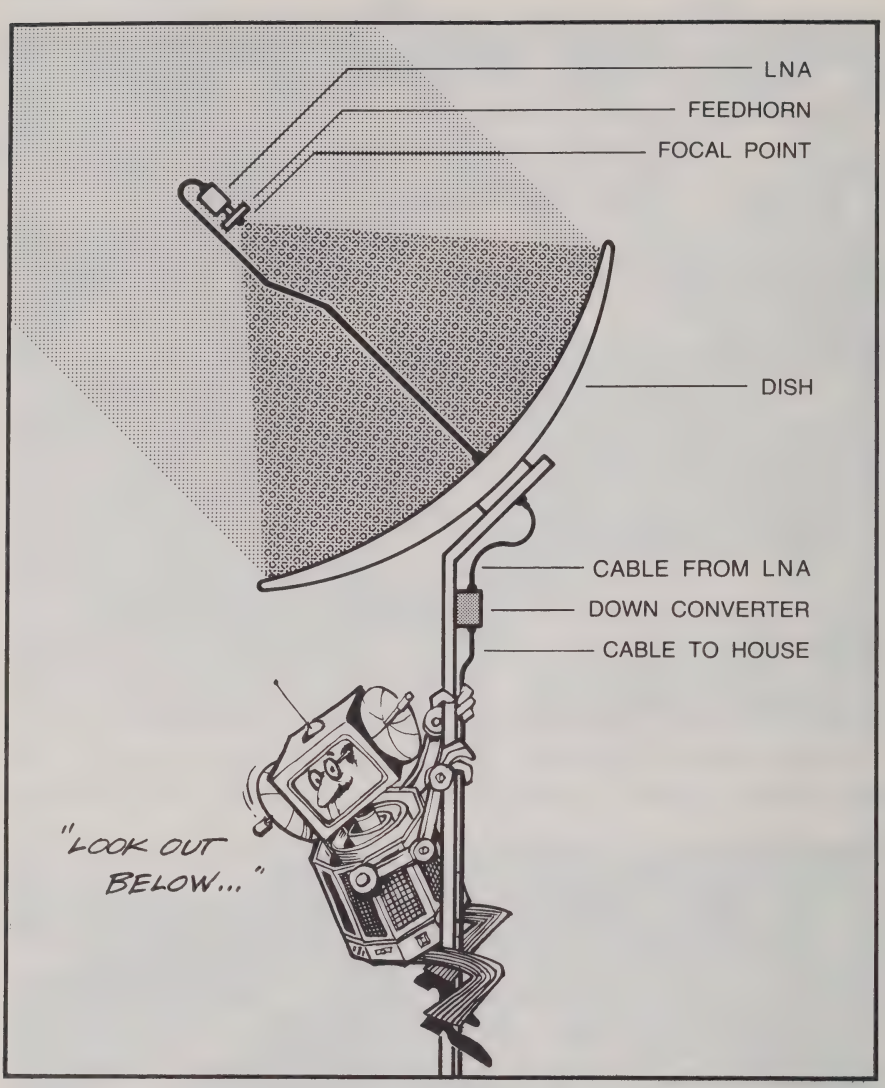


trip home. Let's head down to any one of those backyards that already have a dish.

The Satellite Receiving System

This backyard dish collects the signals as they beam down from the satellite and reflects them back to a common point— called the focal point—which is located to the front and center of the antenna. The dish is curved in such a way that the incoming signals are concentrated at the focal point, making a much stronger signal. Directly over the focal point is a device called the "feedhorn". The feedhorn captures the signals that have been reflected by the dish, and transfers them on to another





A typical satellite receiving antenna.

electronic gizmo called the LNA (low noise amplifier). The function of the LNA is to boost the incoming signal to a high enough level that the system can produce good pictures.

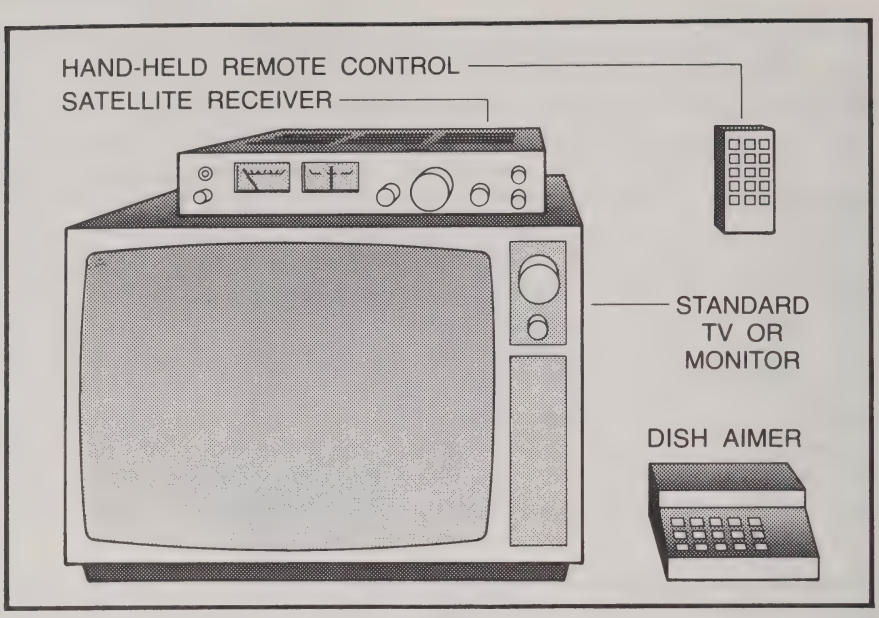
The signals arriving from the satellite are quite weak. Each satellite usually transmits between 5 and 10 watts of power, only about the amount of energy used by a car's tail-light bulb. In the course of its forty-four thousand mile space odyssey from the uplink studios to your backyard, this minuscule signal is reduced to infinitesimal levels by being radiated over a large portion of our planet's surface.

Once the incoming signal has been amplified by the LNA, it is changed from microwaves to a set of lower-frequency signals by a separate electronic gadget called the "downconverter". The signal goes from the downconverter directly to the receiver which is located inside your home.

Before we go inside the house, I should mention one other component that is fast becoming a standard part of most satellite receiving systems: a motorized arm called an "actuator." It lets us steer the dish antenna from one satellite to the next by pushing buttons on a remote hand control. Otherwise you'd have to reposition the dish by hand every time you wanted to change satellites. The limitations of such a hand-cranked system are obvious: who wants to plow through knee-deep snow drifts during the late evening hours to move the dish from one satellite to another? And then there is the problem of how you interpret the frantic gestures of your well-meaning family members who view your efforts from the warm side of the living room window. After a few experiences like these, you'll appreciate the advantages offered by a motorized dish control.

O.K. Now it's time to go inside and see what other pieces of equipment make up a typical home satellite system.

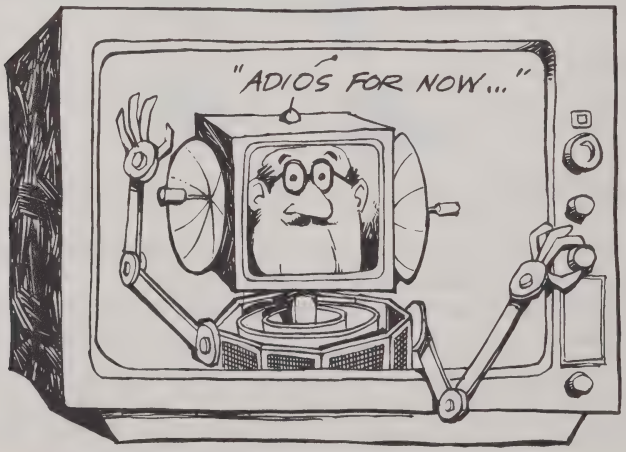
The receiver we're looking at strongly resembles your typical AM/FM stereo amplifiers. It divides the incoming signal into two parts, one for video and one for audio. Each part is filtered and amplified, then finally retransmitted on a channel that your regular TV can receive through a hookup on the back of the TV set.



The indoor elements of a satellite TV system.

While there are a lot of knobs and switches on this earth station, only a few are absolutely essential. A selector knob enables the operator to choose one of the 24 available satellite channels; above the selector knob is a digital readout that shows what channel is tuned in. An audio control adjusts the audio portion of each channel's transmission. Some of the other controls are for obtaining stereo reception from those services which transmit in stereo.

Time for me to be moving along. I trust I've made things a bit clearer. This is Professor Orbiter signing off.



Part Two:
A Consumer's Guide to Satellite TV Systems

Most people choose to have their system professionally installed... for good reason.

Choosing the System That's Right For You

A receiving system represents a substantial investment for you and your family. Before choosing from among the many kinds offered today, it's worth your time to consider all the available options. Only then can you be sure that the system you have purchased is right for you.

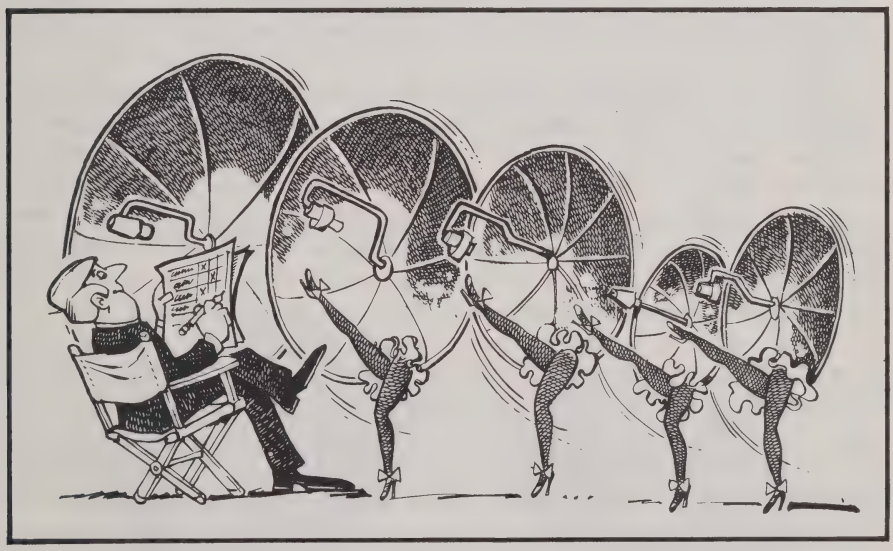
Some dealers offer a package that is the creation of an individual manufacturer; others sell hybrid systems, with each component selected from a different company. With an integrated package, each part of the system is specifically designed to work with all other components in the system for the best reception possible. Many retailers prefer to carry integrated systems since warranties, maintenance and repair activities are greatly simplified. In the long run, this benefits the system's owner as well, since this simplifies service; the serviceman will be familiar with your system, and there will be no difficulty getting spare parts quickly.

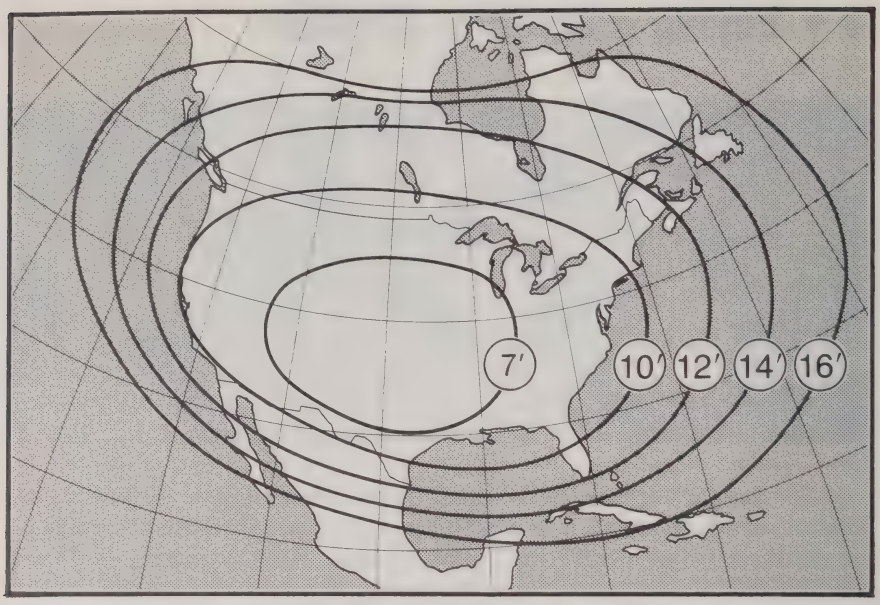
Some earth station dealers prefer to stock components from different manufacturers; a receiver from one, a dish from another and the LNA from still a third. Every client that walks in the door can then be sold a customized system with the exact features that he or she is looking for. Customized systems give you the greatest variety of choices, but the performance of any system depends on how much time and consideration has gone into selecting the right combination of components. The dealer you buy your system from is just as important as what you buy from him. Will the equipment be installed professionally? Will the dealer be able to offer a reliable maintenance service in the event that your system needs attention? While some retailers will be able to give you an effective demonstration at their store, will their equipment operate as well in your backyard?

The only way to get a reliable answer to these questions is to check with other people in your area who have bought satellite systems from your local dealer. Were the other dish owners satisfied with their equipment? How about the dealer's service? How quickly did he respond to a service call? If a dealer has disappointed a friend or neighbor, he may also disappoint you. Consider looking elsewhere, even if you do have to pay a slightly higher price for the same equipment.

4 • Buying a Satellite TV Dish

The satellite dish is the most visible component in any system. It is a kind of receiving antenna. Unlike more traditional TV antennas made up of metal rods, the satellite antenna is shaped like a gigantic salad bowl. Satellite dish antennas are curved in the shape of a parabola, and are often referred to as parabolic antennas. But if you would like to understand how to get the best system for your money, here are a few facts that will help you to sort through all the products currently flooding the satellite TV marketplace.





Minimum dish sizes required for reception of satellite transmissions.

When shopping for a home satellite receiving system, you'll see a variety of dish sizes; they range from four to sixteen feet in diameter. Generally speaking, the larger the dish, the more noise-free channels it will be able to receive. Larger dishes have a greater "capture" area than their smaller counterparts.

What's the right dish size for you? Consider a couple of factors. First, consider that your geographic location is important. On each satellite is an antenna that transmits its signal in a characteristic shape, called a footprint. The signal level will be strongest at the center of the footprint, growing weaker towards the outer edges of the pattern. Most North American domestic satellites have their antennas aimed at the center of the continent. So, if you live on the east or west coasts, you will need to buy a bigger antenna than those folks who live in the midwest.

Some satellites have a stronger overall footprint than others, and some channels on a particular satellite can be stronger than others. While a six-foot dish might be fine for receiving Galaxy G1 in your area, you might need a ten- or twelve-footer to get decent video from all of Satcom F3's channels. It all boils down to a question of just how many noise-free channels you really want to get. If you want every channel to come in crystal-clear, then you'll need a dish big enough to pull in even the weakest available satellite channels. If three or four dozen channels would be plenty, you can use a much smaller and less expensive antenna.

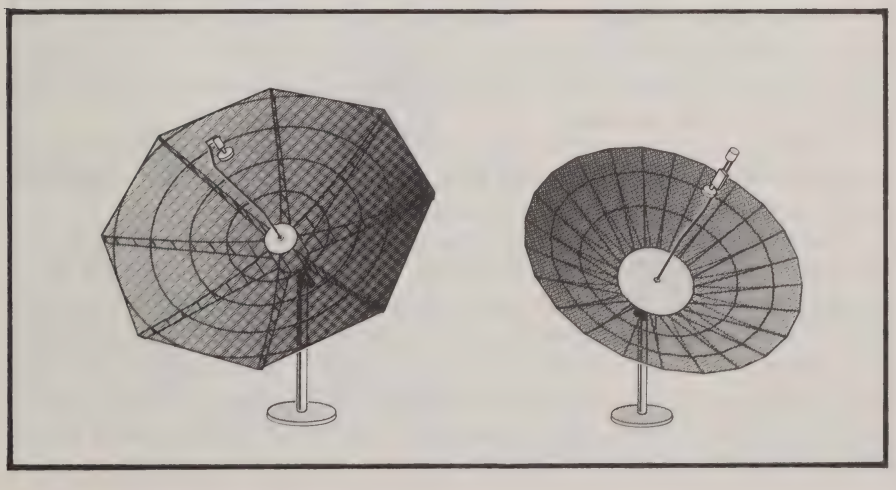
The map averages all the satellite footprints together, so that you can see what the minimum recommended size would be to obtain noise-free reception on most available channels.

Some people are initially attracted to the smaller-diameter antennas. For many locations where space is at a premium, miniature dishes are often seen as the most practical way of introducing an earth station into the neighborhood. While in many cases dishes 4 to 6 feet in diameter can bring in enough channels to satisfy most prospective purchasers, you should be aware of a potential problem for owners of small dishes. A ten-foot or larger antenna pointed at a satellite can receive a bird's transmissions while rejecting signals coming from those satellites on either side. Smaller dishes are less discriminating. Once the satellites are squeezed closer together—as they invariably will be—these small dishes may no longer be able to distinguish between signals from the selected satellite and interfering transmissions from the satellite "next door." Unless you are prepared to upgrade to a larger-sized antenna in a couple of years, I would recommend steering clear of miniature dishes, at least as of this writing.

Home satellite dishes come in a variety of shapes, sizes and colors. One recent satellite trade show displayed more than 200 distinct models. That's a lot of antennas to choose from! Dishes are usually made of solid metal, wire mesh, or a wire screen or cloth imbedded in fiberglass. Dishes made from any of these materials provide excellent reception. Unlike solid antennas, which neighbors might consider an eyesore, the mesh antenna allows one to see through to the scenery behind it. Neighbors who might object to a solid dish because it looks like the Jolly Green Giant's frisbee will often find a see-through model more acceptable.

Many manufacturers coat their mesh models with an enamel paint that will protect the surface from possible damage due to long-term exposure to the elements. Some even provide customers with several color schemes to choose from so you can select the one that best fits in with your backyard.

Typical mesh dish designs.

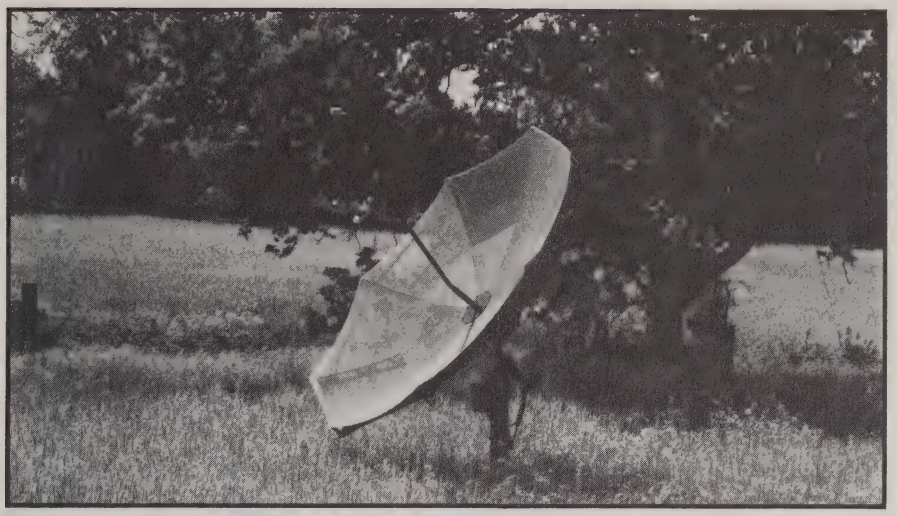


Uniden 11-foot UST 111 mesh dish.

Some antenna designs eliminate the need to fasten the mesh to the frame, and the petals slide into grooves cut into the dish's support struts. This structurally sound and visually elegant method helps to reduce any ripples in the dish curvature.

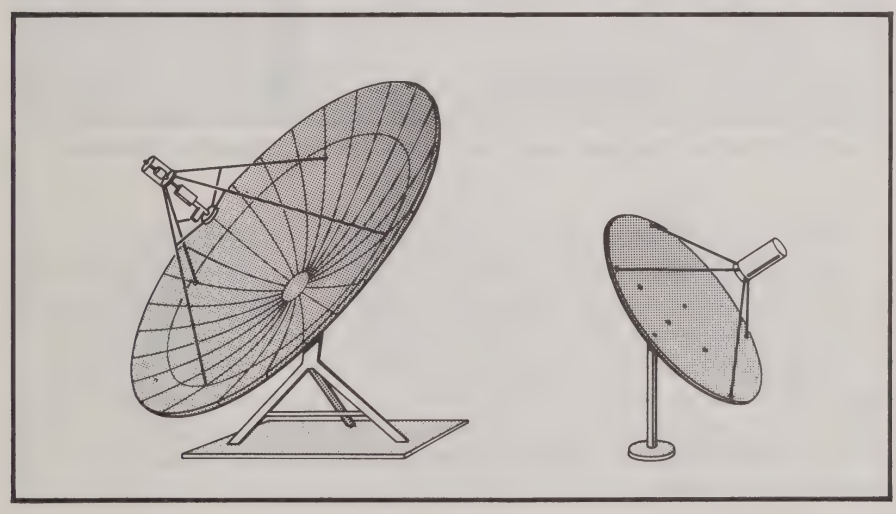
When giving a prospective antenna the once-over, take a good look at all the hardware. Stainless steel nuts and bolts are preferred whenever possible, since they are quite corrosion-proof.

Some of the less expensive screen dishes do not always have the structural strength that solid reflectors can provide. The surface of a satellite antenna must conform precisely to an exact curvature. If there are noticable ripples, bumps, or waves in the surface, its reception will be less than perfect. You can check for this by running your hand across the surface of the antenna. You should also look at the kind of mesh used in the dish. The best screen dishes use a radar-type mesh which is fairly heavy duty. Antennas using lighter gauges of mesh should be avoided.



The solid metal dish is, well, solid! Not only does it maintain its correct shape but it can take quite a beating from all kinds of weather. That's one of the big reasons why most commercial television and radio stations install solid metal dishes at their studios. Only a mean hailstorm can cause them damage; even then, any dents can usually be removed with a rubber mallet. Aluminum is the best metal for solid dishes, usually a marine-grade alloy that is resistant to corrosion when exposed to salt water. Steel dishes are also acceptable, although you must keep them well-painted or they will rust away after being outside for any length of time.

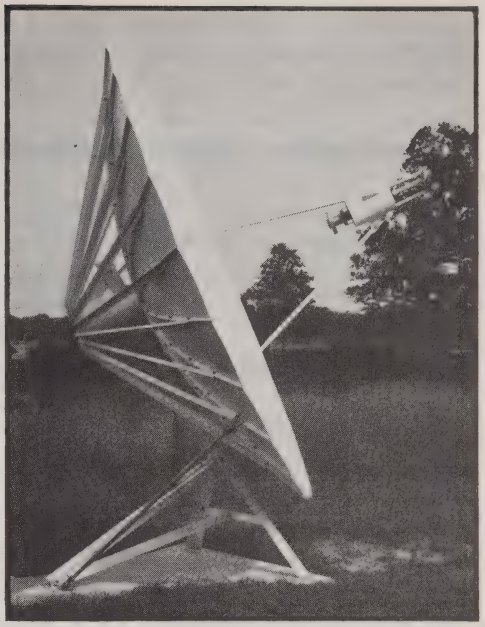
Typical metal dish designs.



Uniden's UST 108, an 8-foot dish made from a single piece of hydroformed aluminum.

There are two basic types of metal dishes: the solid one-piece antenna or the multiple petal dish. One-piece antennas often have the most accurate curvature, and are the easiest to assemble. But they are expensive to ship. Multiple petal dishes are in wider use; correctly assembled, their performance is equal to their one piece counterparts. When examining a petal dish, look at how the various petals fit together. Does the surface look smooth and continuous, with constant curvature from petal to petal? Keep in mind that minor variations of a fraction of an inch can affect the performance of the dish.

Fiberglass antennas have also become popular. As with solid-metal, the fiberglass dish can come as a one-piece or with multiple petals. All fiberglass antennas actually have a wire mesh or metal cloth embedded in them; without a metal base to act as a reflector, the incoming satellite signals would pass right on through the fiberglass material. Manufacturers use several methods for making fiberglass antennas. Some spray layers onto a master mold; others use fiberglass-reinforced compression-molded plastic.



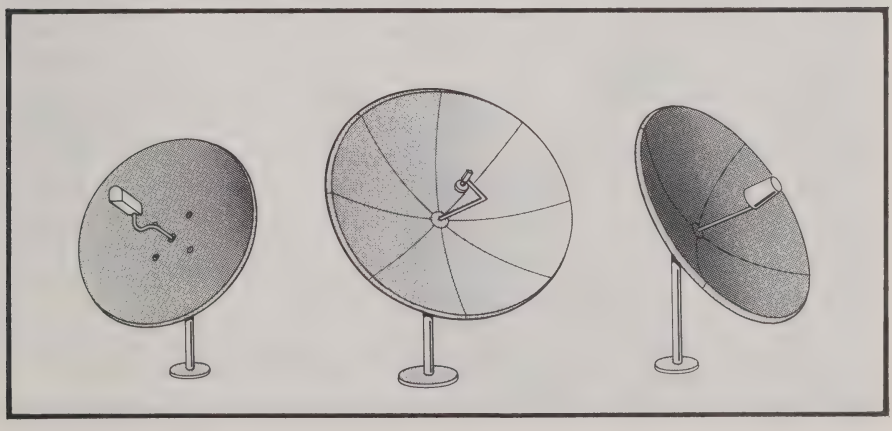
13-foot multiple petal dish.

A high-quality fiberglass antenna will work as well as any mesh or solid antenna of the same size. The main disadvantage of some of the cheaper fiberglass dishes is that after years of exposure to the weather they may crack or even warp, distorting the antenna's all-important shape. The best fiberglass dishes avoid warp and distortion by building a substantial ribbing framework into the back of the dish.

Checking the Dish

Occasionally you might find a brand-new antenna that is warped. You can visually check for warp in the antenna by sighting from rim to rim. The edge of the rim at the opposite side of the antenna should line up parallel

Typical fiberglass dish designs.



to the section of rim closest to you. If you see high or low spots, then the antenna curvature is not the perfect parabola essential for best performance.

Understanding Antenna Specifications

Dish size has a lot to do with how well it works but there are other factors to consider. When two antennas are of equal diameter, it's a good idea to compare the specifications. Let's take a quick look at what you can learn about a dish from its technical specifications.

Antenna Efficiency

A dish's "efficiency rating" tells you how much of the available satellite signal is actually reflected to the feedhorn. Most antennas have an efficiency rating of at least 55%, which means that only a little more than half of the signal striking the surface of the dish is actually being used. By careful manufacturing to minimize potential curvature errors, some dish designers have achieved a 60 or 65% efficiency rating. A few superbly designed antennas can have better than 70% efficiency.

Knowing the efficiency rating of an antenna can tell you a lot about how good it is. A ten foot antenna with an efficiency of 70% will perform just as well as an eleven foot antenna with a 55% efficiency rating.

GAIN VS. DISH SIZE CHART

SIZE IN FEET (METERS)	GAIN	AMPLIFICATION FACTOR *
6 feet (1.8 meters)	34.0-35.8 dB	x 3500
7 feet (2.1 meters)	35.4-37.1 dB	x 4000
8 feet (2.4 meters)	36.5-38.3 dB	x 5500
9 feet (2.7 meters)	37.5-39.4 dB	x 7500
10 feet (3.0 meters)	38.4-40.3 dB	x 9000
11 feet (3.4 meters)	39.3-41.1 dB	x 10000
12 feet (3.7 meters)	40.0-41.9 dB	x 12000
13 feet (4.0 meters)	40.7-42.6 dB	x 15000
14 feet (4.3 meters)	41.3-43.2 dB	x 18500
15 feet (4.6 meters)	42.0-44.0 dB	x 22500
16 feet (4.9 meters)	42.5-44.4 dB	x 24000
20 feet (6.1 meters)	44.5-46.3 dB	x 30000

* an approximate magnification factor for each dish size that indicates how many times more powerful the signal is made by each antenna.

(The gain for any dishes you encounter should fall somewhere within the values provided for a given antenna size).

Antenna Gain

Another thing you often hear about is the "gain" of the antenna. The gain specification tells how much the antenna will amplify the incoming satellite TV signal. Gain is measured in decibels or dBs. An antenna with 42 dB of gain will work better than one with 41 dB of gain, and so on. Generally speaking, the higher the gain, the better the antenna. The chart gives the typical range of gain that can normally be obtained from antennas of various sizes. If one antenna has 3 more dB of gain than a second model, then it will deliver twice the amount of signal to the LNA for amplification.

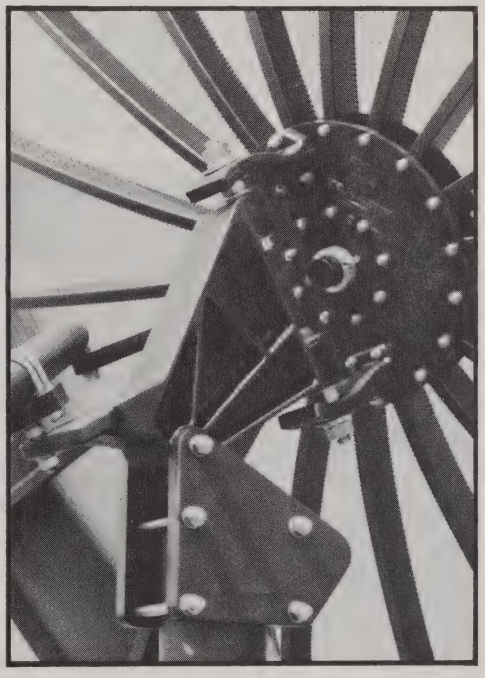
Deep Dish is Not Just for Pizza

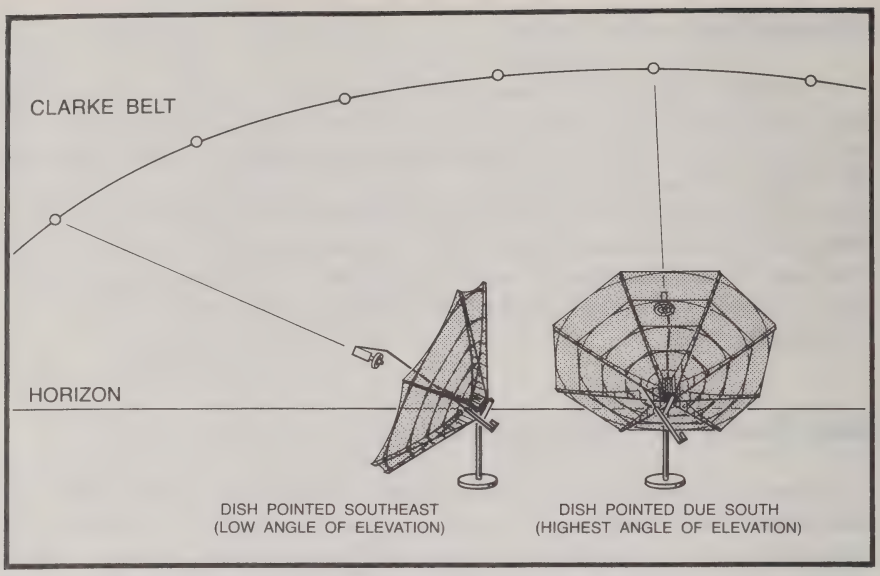
Sometimes you'll hear dishes referred to as deep or shallow. This has to do with the depth of the parabolic curve selected by the dish designer. A deep dish will have its feedhorn near the surface of the antenna, while shallow models have the feed and LNA suspended far above the center of the reflector. Either deep or shallow antennas can give excellent reception of satellite TV services, but a deep dish provides more protection from interference in crowded urban and suburban environments.

Antenna Mounts

The geostationary satellites over North America orbit in an arc that stretches from our southeastern to our southwestern horizons. This arc duplicates in our southern skies the curvature of the earth itself. A special kind of antenna mount-called a "polar mount"—is used by dish manufacturers. This enables the antenna to follow the arc of the satellite "belt" with great precision. When the antenna is pushed to the east or west, the polar mount will either raise or lower the dish so that it remains directed at this arc.

A cast aluminum polar mount.

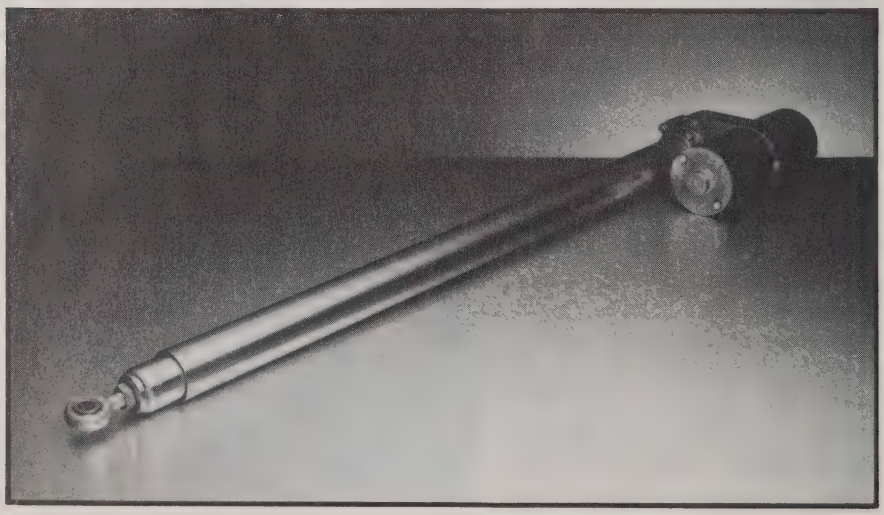


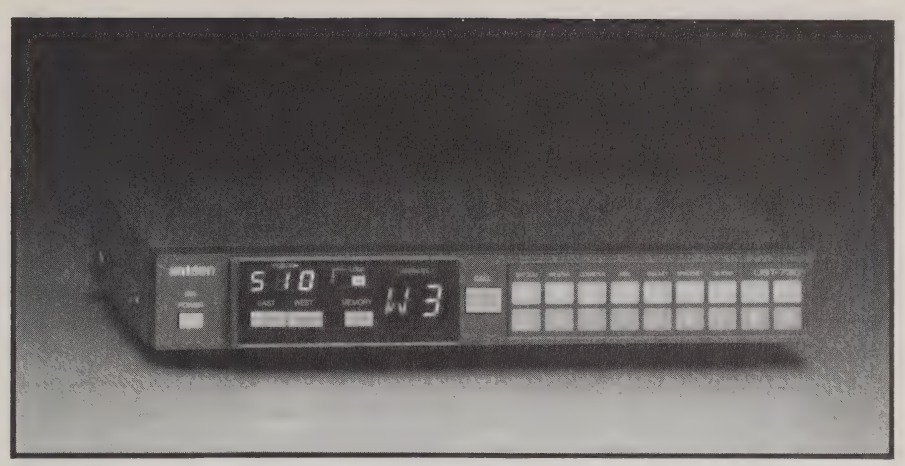


The elevation angle changes as a dish is moved from east to west.

Moving the Dish

There are 20 satellites orbiting the southern skies off our continent today, each with its own specific location in the sky relative to your home. When you want to watch the programming carried by a different satellite, you will need to reposition the antenna. All satellite dish manufacturers ship their antennas with either a hand-crank or a slide bar which allows their products to be positioned manually.

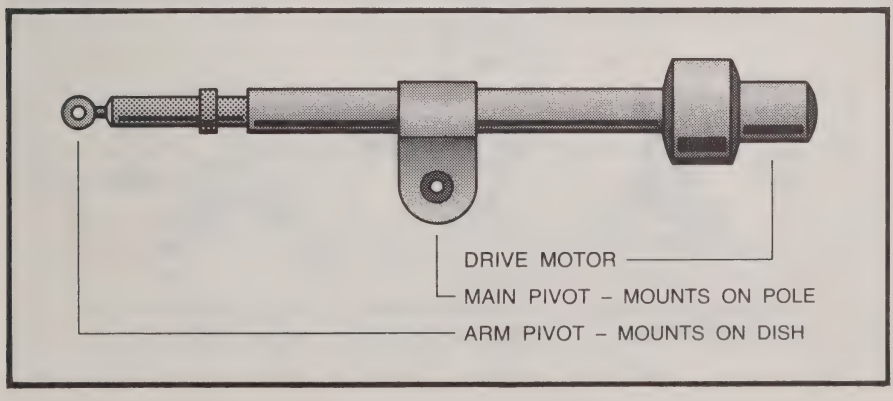




The UST 730 automatic antenna positioner from Uniden.

After you have walked out to the dish a thousand times or more—in all kinds of weather conditions and at all hours of the day or night—you'll begin to long for the convenience of a motorized dish controller. If you have to hand-crank your antenna every time, you won't want to change satellites very often; no one wants to spend their weekend racing back and forth between the dish and the house in a seach of the best baseball or football game. Depending on their sophistication, motorized controllers cost an additional $300-800, in my opinion a small price to pay for the time and energy saved. This kind of mechanical arm is called an actuator. The arm's motor is controlled by a remote console indoors near the satellite receiver, so you can do your satellite-hopping from the comfort of your living room. Controls range from a simple east/west switch that steers your dish from one satellite to the next, to computer-automated consoles that pinpoint your favorite satellites at the push of a button.

A typical actuator arm.



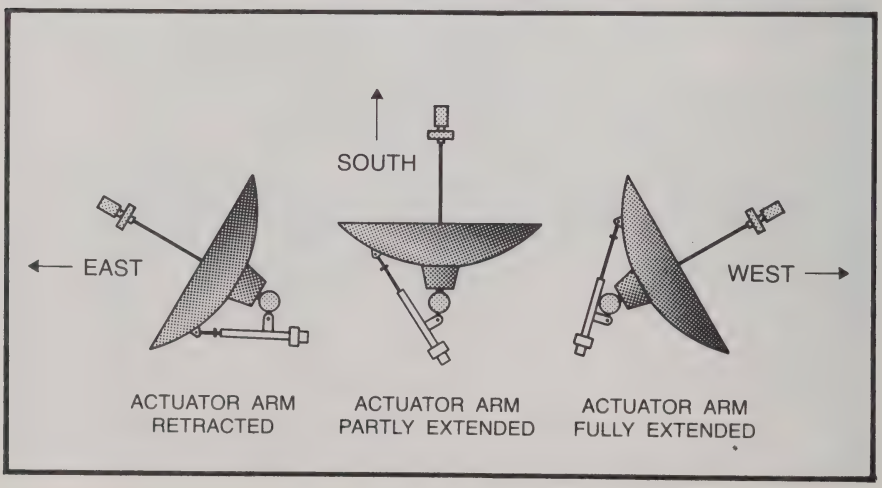
Choosing an Antenna Actuator System

An antenna actuator consists of a long cylindrical arm that is connected to an electric motor. Turn on the motor and the arm can be extended or retracted, moving the dish to the east or west. There are several different actuator stroke lengths to choose from; the appropriate one for your setup will depend on which type of antenna it will be pushing. Your satellite retailer will help you select the right stroke length for your dish. You can also choose from a variety of actuator motors. Some require AC voltages for operation while others will work with a DC power source. The voltage required can also vary anywhere from 120 volts AC to as low as 12 volts DC. Medium- or low-voltage DC motors are the safest to operate, minimizing the possibility of electrical shock. Actuators come with a power supply that has the required operating voltage.

The motorized actuator can be controlled by a simple east/west switch or a sophisticated microprocessor with its own built-in computer memory. The east/west control is easy to operate and carries an economical price tag. Some even offer a numerical display that provides a relative read-out of your antenna's current position. These east/west remote controls require far more operator participation to get from one bird to the next, but it won't take you too long to get the hang of it.

Computerized controllers take the mystery out of satellite navigation. Using the keyboard on the front of the controller, you enter its code number. A few models have a button for each satellite—just push your satellite's button and sit back. All of these computerized products have a built-in electronic brain that stores the position of each satellite in its memory. When you push the code for a particular satellite, the controller recalls the position programmed into its memory, and turns on the

Retraction and extension of the actuator arm moves the dish from east to west.



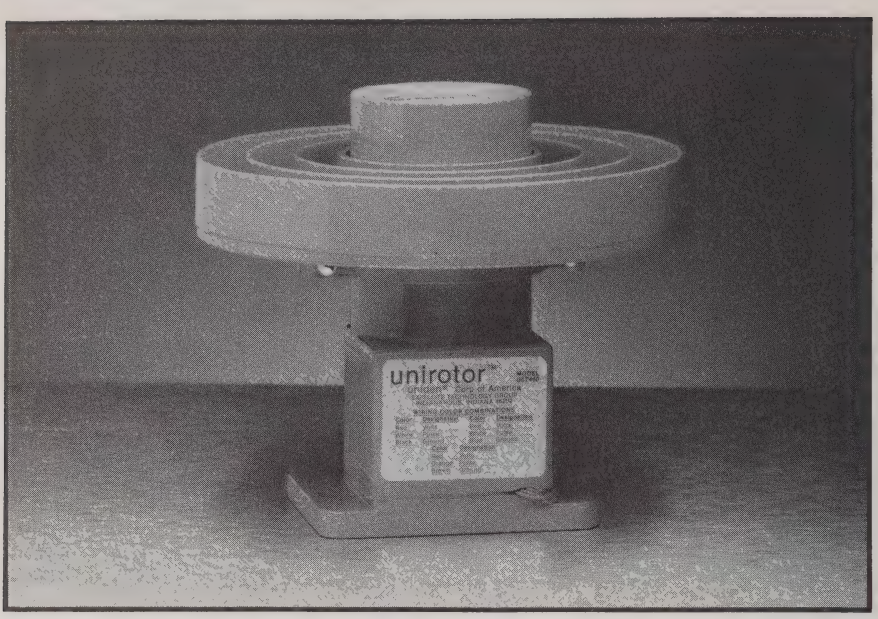
Uniden's UST 770 gives you instant access to up to 35 preprogrammed satellite positions.

antenna's motorized arm until the dish arrives on target. Your system installer will program the positions of all the satellites into memory during the initial set up of the system. Be sure to keep the instruction manual in a safe place, in case you have to reprogram it later.

To keep the satellite locations in memory, most microprocessor-based controllers must be connected to a power source at all times. If you unplug your unit, or if your electrical service is momentarily interrupted, the computer could forget everything. To keep this from being a problem, most automated controllers have a built-in rechargable battery which will protect the memory from being erased for a day or two. But if it does get erased, don't panic: reprogramming really isn't all that difficult.

Today's computerized controllers have other features too, such as parental lockout control, digital readout, programmable actuator limits, and even wireless remote control. The parental lockout feature prevents access to any satellites which you designate as off-limits. That way, when you go out at night you can rest assured that your children aren't getting their sex education from one of the late-night adult entertainment channels. Some units have a key-operated parental lock-out control, while others require a special entry code before the dish can be pointed at certain satellites.

Some units offer a numerical readout of the code for the current satellite while others show the actual satellite name. Programmable actuator limits prevent the antenna from going beyond either end of the actuator's stroke limit. Some microprocessor-based controllers have hand-held wireless remote controls for changing satellites from across the room—or in some cases—from any room in the house.



Uniden's Unirotor feedhorn with mechanical polarization.

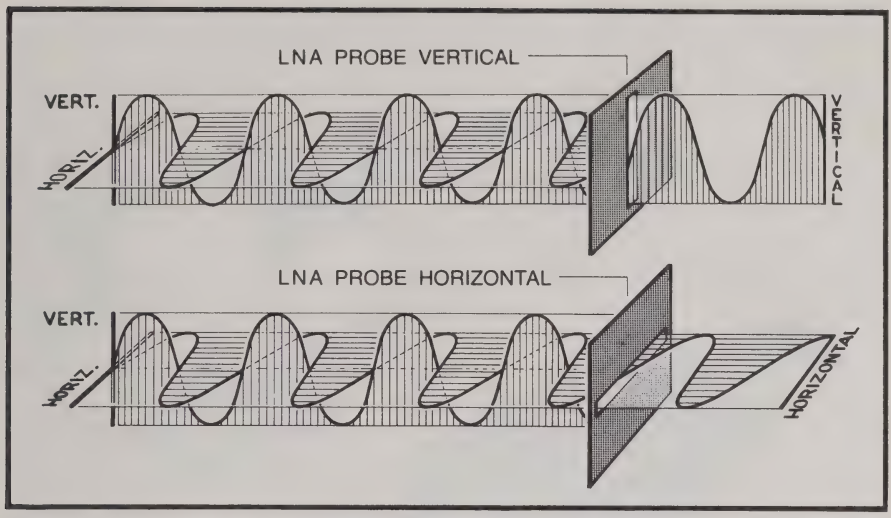
Feedhorns and Polarizers

When the satellite dish is directly pointed at a given satellite, almost every square inch of its surface will be struck by the incoming signal. No matter where on the dish the signal lands, it gets reflected to the focal point directly to the front and center of the antenna. The incoming signal is collected by a metallic device called the feedhorn which is positioned right at the focal point. Signals falling into the tube-like opening of the feedhorn are conducted to its rear, where the first stage of receiver electronics is located.

Some feeds are designed to work well with a shallow dish design, others with a deep dish. It is important that the feed you get is the best match for the antenna of your choice.

Polarizing the Signal

Our North American satellites transmit their signals in a pattern which positions their waves of energy in either a vertical (straight up and down) or horizontal (lying flat) orientation, or polarity. When a satellite receiving system is tuned for horizontally-polarized signals, the strength of any vertically-polarized transmissions coming from the same satellite will be minimized. The early Westar and Anik satellites used horizontal polarity alone, and could only transmit up to 12 channels of TV, the most channels that fit into the limited range of frequencies then available for satellite use.

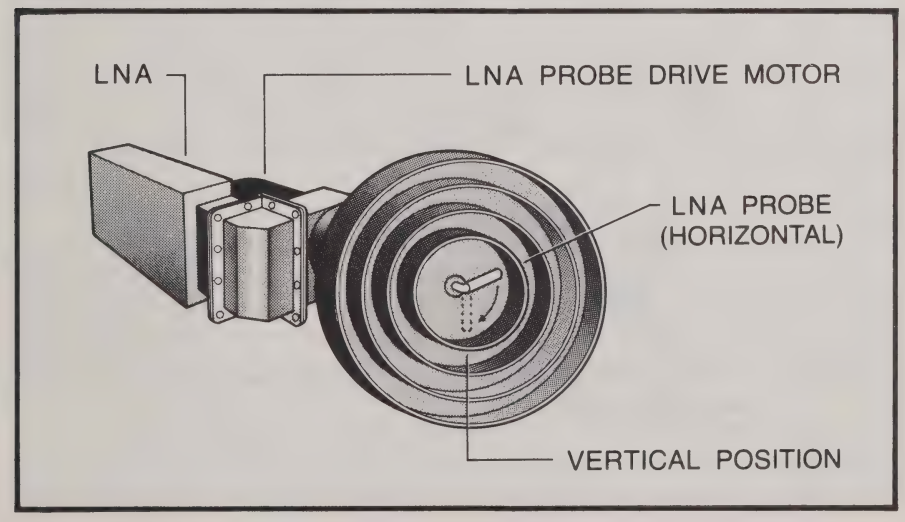


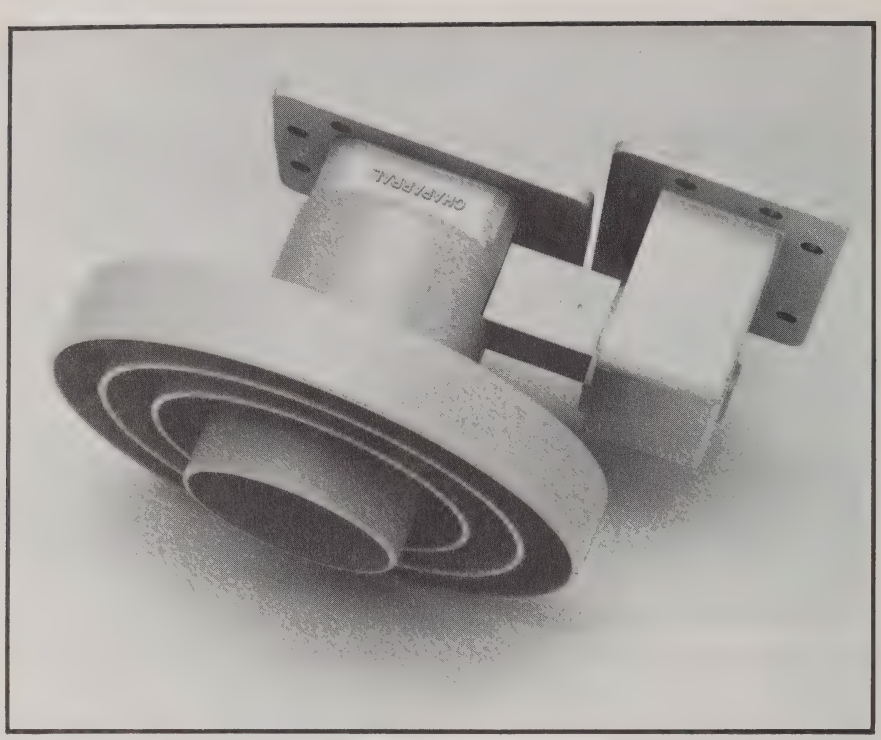
The position of the LNA probe determines which signal polarity will be received.

RCA's engineers quickly saw that a satellite could use the same frequencies twice if one set of twelve channels was polarized horizontally while the other set was polarized vertically. By overlapping channels of opposite polarity, RCA was able to transmit 24 channels with their first domestic Satcom satellite. Today, dual polarized satellites are the rule rather than the exception.

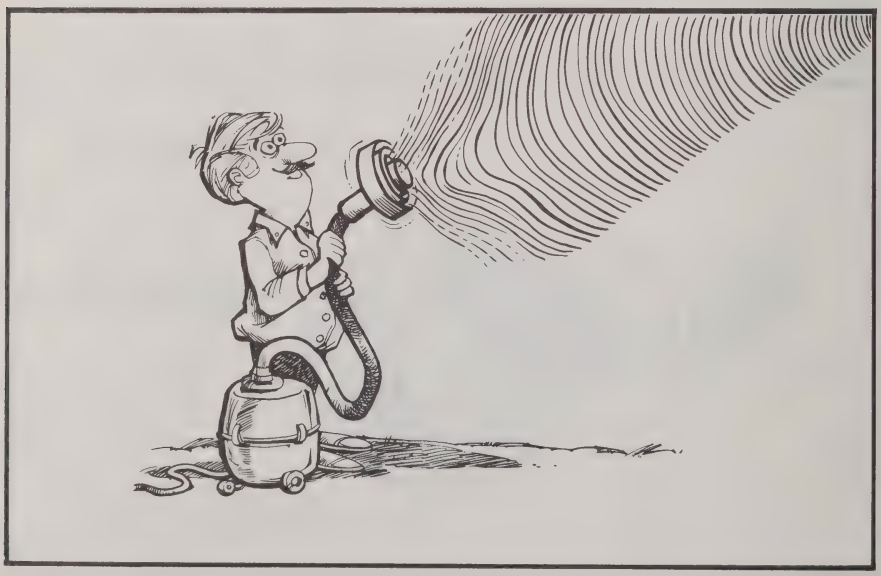
Every satellite receiving system tunes into signals of either polarity. In most cases, the circuit which selects the appropriate polarity is built right into the feedhorn itself.

Scaler feed and LNA showing probe and probe drive motor.





Dual Feed provides simultaneous reception of both polarized signals through two separate LNAs.



5 • Buying a Home Satellite TV Receiver

Besides your dish, actuator and antenna feed, your system consists of several other electronic components that process and refine the incoming satellite TV signals. This chapter will help you choose those features your family will want in order to fully enjoy the world of satellite TV.

Downconverters

Every satellite TV system has a downconverter that changes the incoming satellite TV signals to lower frequencies before sending them on to the indoor receiver. There are three different kinds of downconverters manufacturered, each with its own special purpose.

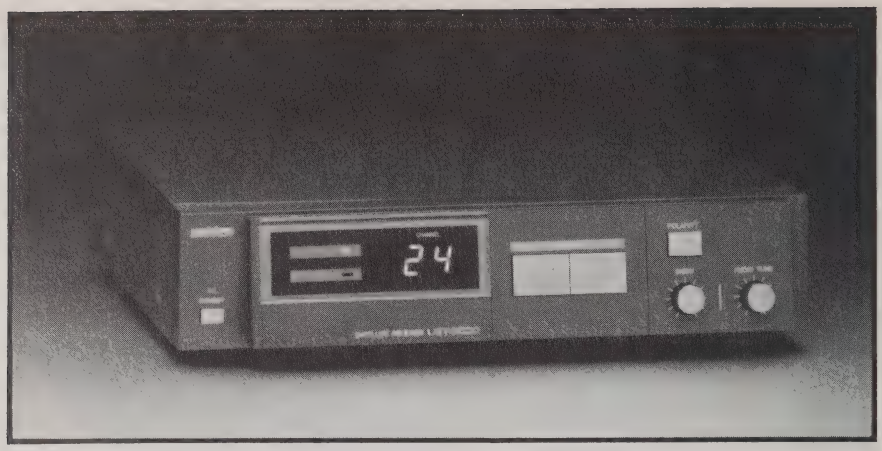
Single, Double or Block Downconversion

Single conversion is the most common method used in today's satellite TV receivers. Single-conversion receivers reduce each incoming satellite TV channel to a much lower frequency, called an "intermediate frequency." This is done so that the rest of the receiver's electronic circuits can efficiently process the signals. It is done in one step, which is why it is called "single" downconversion.

Single-conversion receivers are less selective: They will not only receive video from the channel tuned to, but also an "image" signal from another channel on the same satellite. Sometimes the image signal will interfere with the desired channel, but most owners of single-conversion systems are usually satisfied with the quality of their reception. *If you are considering purchasing a single-conversion receiver, be sure it offers at least -25 dB of image rejection , or you might not be pleased with the reception.*

Dual-conversion receivers reduce the selected satellite TV channel first to one and then to a second intermediate frequency. By using two stages of electronics, double-conversion receivers are able to achieve a much higher level of selectivity; they are not at all susceptible to problems of image interference. The cost of a dual-conversion receiver is usually much higher than a similar single-conversion model because of the added electronic circuitry.

Because of their superior design, two or more dual-conversion receivers can be hooked to the same antenna and LNA without creating any interference problems; that way several people can watch different

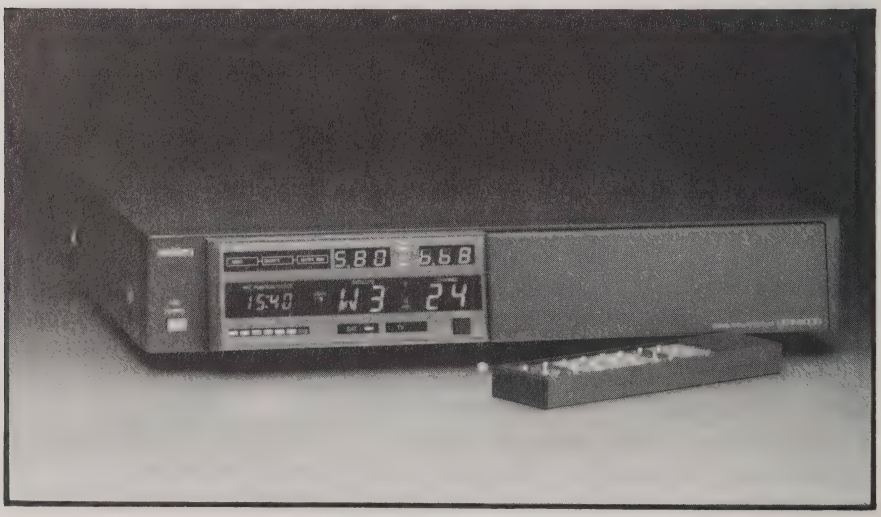


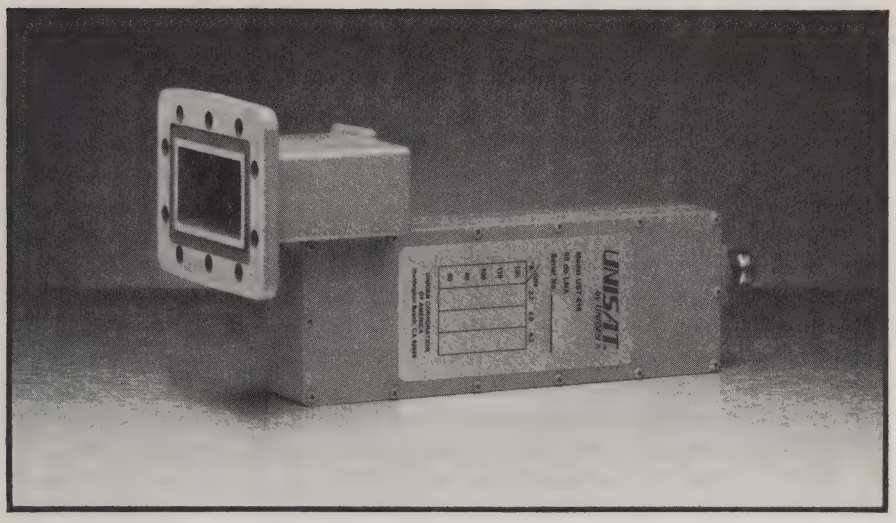
Uniden UST 5000 block downconversion receiver.

channels on the same satellite at once. It is possible to connect two or more single-conversion receivers to the same satellite dish. Additional components — called isolators — are then required to prevent one receiver from interfering with the others.

Unlike single- or dual-conversion receivers, which can only obtain a single channel at a time from their downconverters, block downconversion receivers simultaneously get all 12 channels of a single polarity through one wire cable. Block downconversion systems are designed so that multiple receivers can be easily and inexpensively connected to a common antenna and LNA.

The Uniden UST 9000 receiver, featuring block downconversion, stereo sound, built-in antenna position controls, and full-function wireless remote control.



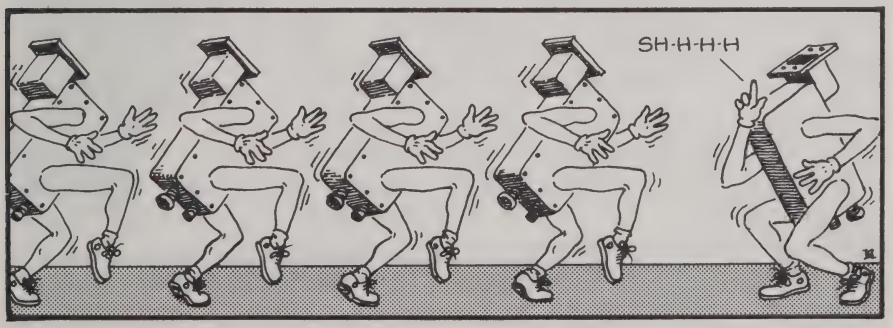


Uniden LNA.

The ABC'S of LNA's

At the "front-end" of the electronic portion of your satellite TV system is a kind of signal booster called a Low Noise Amplifier—LNA for short. LNAs are graded according to their "noise temperature." The higher the temperature, the poorer the picture. If you were to substitute a 90° LNA for a 120° unit, you would see a noticeable improvement in the quality of your video—especially when receiving some of the less-powerful satellite signals. Using a super-quiet 70° or 80 ° unit would go even further in erasing some of those little black dots of noise or sparklies that streak through the video from some of the weaker channels.

Choosing a 70° or 80° LNA instead of a 120° unit would have the same effect on your reception as if you added an extra foot onto the rim of the antenna. So, for installations where space is at a premium, switching to a lower noise temperature LNA can let you use a slightly smaller size of antenna.



In addition to the standard low noise amplifier, there are other front-end packages which combine the LNA and downconverter into the same water proof enclosure. These units will also deliver high-quality video into your home.

LNBs

An LNB—satellite shorthand for "low noise block downconverter"—combines a standard LNA with a special kind of downconverter. LNB systems can be inexpensively expanded so that members of your family can independently choose the satellite TV channels they want from several locations around the home. While this may not seem like an important feature when you are first considering the purchase of a system, you may feel different when the kids are clamoring for cartoons when you are right in the middle of your favorite show.

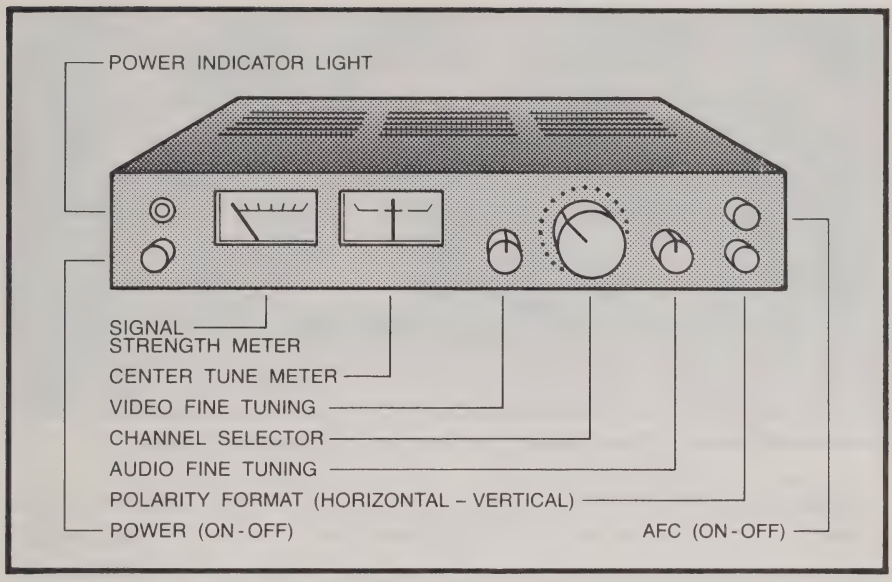
Any number of receivers can be hooked to the same LNB. Each receiver is able to choose among any 12 TV channels of a given polarity. Some systems can even use two LNB's—one for each polarity—so that each receiver in the system can independently select any one of the 24 possible TV channels on a given satellite.

An LNB is not the only way to utilize more than one receiver, however. Some manufacturers offer a block downconverter that is separate from the LNA. Using separate components is about the same as an LNB, as far as cost and performance are concerned. Any system which uses a separate LNA and regular downconverter can also be expanded for multiple-channel access within the home. This will, however, require specialized components that make the system more complex and increase its overall cost.

LNCs

Another type of LNA package available these days is the LNC—satellite shorthand for "Low Noise Down Converter." A standard downconverter and LNA are combined in one unit. Like the LNB, the LNC eliminates the need for a separate downconverter enclosure as well as a connecting coaxial cable. However, when an LNC is used, the system cannot be expanded through the addition of multiple receivers. So if you are going to buy an LNC system, be sure that you won't want to add more receivers to your system later on.

Unlike LNAs, which are generic in nature and are regarded as a separate component from the rest of the receiving system, LNBs and LNCs are considered an integral part of the satellite TV receiver. Thus, while a malfunctioning LNA can be readily replaced by another brand, the replacement for an LNB or LNC must be the identical model from the original manufacturer. Before purchasing an LNB or LNC, check with your satellite retailer to make sure that he keeps an adequate stock of replacement units on hand.



A typical satellite receiver.

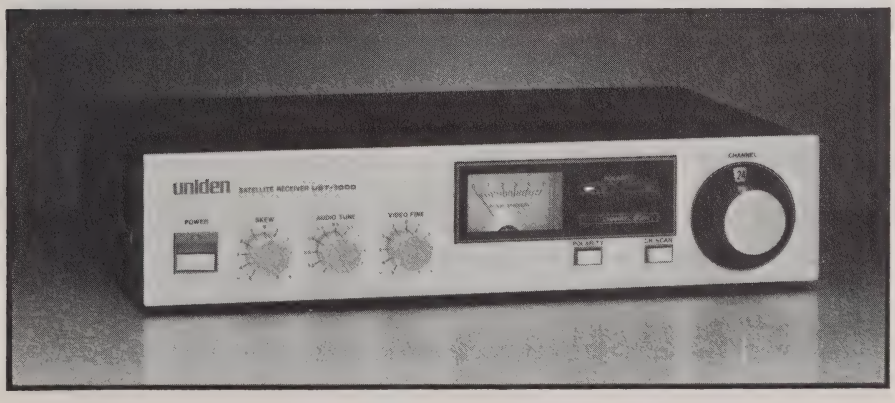
Basic Receiver Knobs, Dials and Buttons

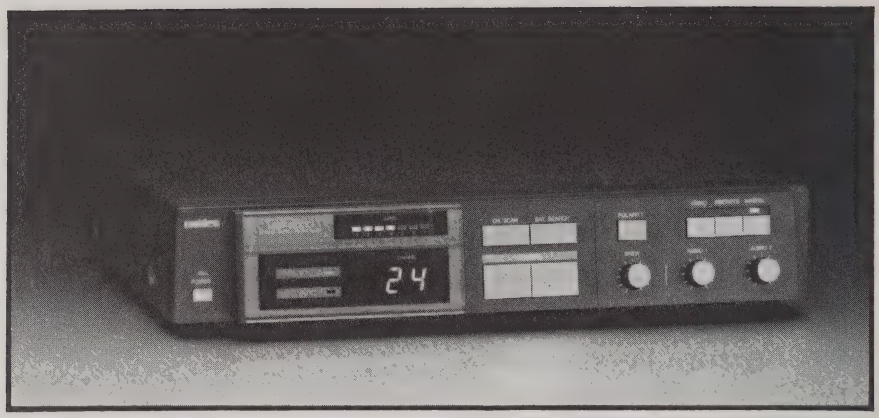
Let's take a look at some of the knobs, dials and buttons that you are likely to find on any of today's satellite TV receivers. The following checklist will explain what each control does and how it can improve your reception of satellite TV signals.

Power. This is the on/off switch that turns your system on.

Channel Selector Knob. This control determines which satellite channel you will be watching. The knob on some sets has 24 separate positions that click into place as you adjust it. Other receivers feature

A satellite receiver with a distinct position tuning knob, model UST 1000 from Uniden.





Receiver with up-down channel selector buttons, Uniden's model UST 6000.

continuous tuning similar to the control knob on an FM stereo set. While either kind of selector will let you tune your receiver to the desired channel, only the type with distinct positions for each channel can automatically select the correct polarity. Continuous-tune receivers must be manually adjusted every time you switch from one polarity to the other.

Some receivers replace the channel selector knob with a couple of buttons. Pushing one button causes the receiver to slide up the channels while the other one brings it down. A digital readout shows the channel number being received.

Other types of satellite receivers get their channel selection instructions via a keypad on the receiver or from a hand-held remote control.

Audio Tuning Control. Each satellite channel can carry not only a video signal and its sound track, but additional audio signals from radio networks or news services. Every satellite TV receiver has an audio control which will let the operator select from any of the audio signals carried by a given channel. In most cases the audio control will be a knob that must be tuned to the desired audio signal. However, a few receivers will also provide immediate access to the sound portion of each TV channel via a couple of pushbuttons. This simplifies the audio tuning for those folks who want to quickly access the available TV services; without it, you'll have to go tuning for the audio portion of your program.

Signal Strength Meter. Most satellite TV receivers have a meter that shows the relative strength of the incoming signal. It comes in handy when you want to fine-tune the receiver's polarization control or pin point the antenna onto a particular satellite. Some satellite TV receivers use a light bar for a signal strength indicator instead of a regular meter. While these are pretty to look at, they are not as useful as a meter for fine tuning the system.

Tuning Meter. Some satellite receivers will also have a tuning meter that lets you know when you have correctly tuned into each TV channel.

Polarity Format Switch. Some satellites use horizontal polarity on the even-numbered channels and vertical on the odd ones, while other satellites do just the opposite. This switch is activated whenever moving from one type of satellite to the other. Some of the latest receivers have automatic polarization and skew adjustment—clearly the wave of the future.

Polarity Selector. This switch is only found on receivers that do not automatically select the correct channel polarity. It allows the viewer to tune the satellite TV system to either horizontal or vertical polarization.

Video Fine Tune Control. If your picture ever gets fuzzy, you can use this control to adjust the video for the best possible picture. Some receivers have a "center-tuning" meter; you adjust the fine tune until the needle reaches the center position.

Video Inversion. A seldom-used control that changes the incoming video into a kind of negative image. (This is an example of how some engineers will include a feature because it is technically possible rather than useful.)

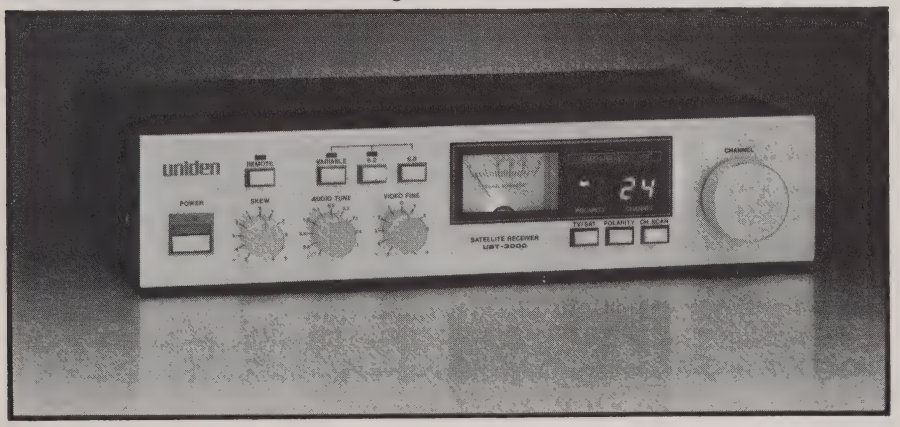
Automatic Frequency Control [AFC]. If you find that you need to keep adjusting the receiver's fine tune in order to receive the best-possible picture, you can switch on the AFC control. This will help to stabilize the video and keep the receiver from drifting out of tune. For some receivers, the AFC is on all the time, with no way to get around it.

Scan Tuning. When this control is on, the receiver will continue to scan through all 24 available channels. Some receivers even offer two scanning speeds: slow-scan lets you see what each channel is airing, quick-scan is useful when moving the dish from satellite to satellite.

Skew Control. This provides the operator with a way of fine-tuning the polarity of the system.

Modulator Switch. Lets you watch the incoming program on either channel 3 or 4 of your regular TV set.

Uniden's model UST 3000 receiver with signal strength meter, video and audio fine tune, skew control and automatic scan tuning.



Uniden UST 7000 wireless remote control receiver with built-in stereo decoder.

Satellite Receiver Extras

The dials, and buttons we've mentioned so far are basic controls commonly found on most satellite TV receivers. Many other options are available on some of the more sophisticated units. While an array of "extras" isn't necessary for good reception, they can further enhance a system's performance or make it easier to operate. But don't think that you absolutely must have all these things in order to fully enjoy satellite TV. That's why all these features are called "extras" and not "essentials!" On the other hand, some of these optional features might be just what you are looking for. So let's take a look at just what they can do to increase your viewing—and listening—pleasure.

Remote Control. A hand-held remote control is an option on many satellite TV receivers. Some remote controls are wireless, while others have a cord that plugs into the back of the receiver. The remote control is turned on by pushing the "remote" button on the front of the receiver.

Wide/Narrow Audio Filter. This can improve the sound quality when receiving the FM radio signals available via satellite.

Stereo Tuning Control. Some receivers have a stereo decoder for full-stereo reproduction of your favorite satellite entertainment channels. You have to adjust two audio knobs to recreate both left and right channels of sound. While a few stereo satellite TV receivers come with a built-in amplifier and a pair of speakers, most receivers must be hooked into your home stereo sound system.

Audio Noise Reduction. Some receivers have Dolby or other forms of audio noise reduction circuits that can improve the sound.

Threshold Extension. This is a filter that can be switched on whenever you are receiving one of the weaker satellite TV channels. It will help take some of the "sparkles" of noise out of the video.

If you will want to eventually add a descrambler or stereo processor to your system, you'll want to make sure that the receiver you buy has the following options:

Composite Video Output. This jack provides a signal that can be connected to a stereo processor for full-stereo reception.

Unclamped Video Output. The clamp circuit filters the signal before it gets amplified by your receiver. But if scrambled signals are clamped before they are descrambled, the translation will be garbled. For your receiver to be compatible with any of the descramblers now being leased by CANCOM and others, it must either have a switch for defeating the video clamp circuit or a separate jack that puts out unclamped video.

Receiver Threshold

One of the most important specifications for any satellite TV receiver is its *threshold rating*. Unless a satellite TV signal is stronger than the receiver's threshold level, the video will have some impulse noise—or sparklies—in it. The weaker the signal, the greater the amount of noise in the picture. As the signal level approaches the threshold level of the receiver, most of the noise disappears. Once the strength of the incoming satellite signal is well above the receiver's threshold, the last stray sparkles of noise vanish entirely.

A low receiver threshold rating is a sign of high sensitivity. Signals that would be noisy on a receiver with a relatively high threshold can be perfectly clear on one with a lower threshold. I recommend getting a receiver with as low a threshold rating as possible. Most receivers now have a receiver threshold rating of 8 dB; a few of the more expensive models even achieve threshold levels of 7 dB, which is even better. Lowering the receiver threshold by 1 dB has the same effect as increasing the diameter of the antenna by a foot. For installations where space is at a premium, you may want to consider getting a receiver with a lower threshold rating so you can use a slightly smaller dish.

Pre-Installation Checklist

Have your system dealer look at your site to make sure there is a good location for the dish to have an unobstructed view. In urban or suburban areas, or anywhere near a telephone microwave relay station, have the location checked for microwave interference.

Be sure that your installation complies with all local zoning ordinances. Some towns may prohibit satellite TV systems; others limit installations to antennas less than three or four feet in diameter. There's no use investing in a system that local authorities are going to make you pull out. For some locales, you may need to get a building permit and you'll want to make sure the antenna is installed at a certain distance from the property line. Your installer should be familiar with local ordinances.

6 • Satellite TV Accessories

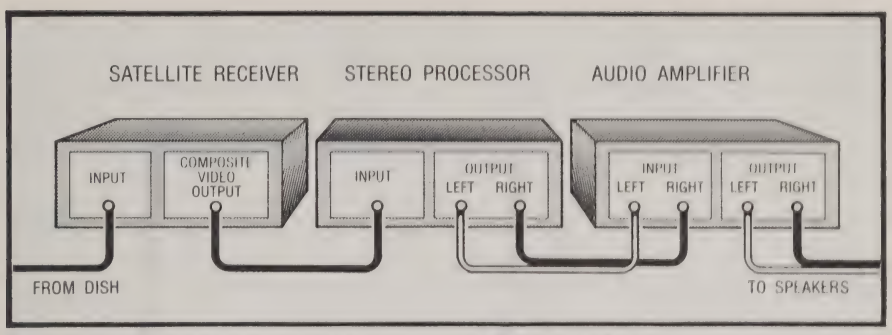
Once you have understood all the knobs, buttons and dials on the front of your satellite TV receiver and antenna controller, you may want to add one or more accessories to your earth station. After all, a satellite TV receiver is only one of the major building blocks within any first-class home entertainment system. Many of the following items can vastly enhance your viewing and listening pleasure and provide access to an even greater number of satellite TV channels.

Stereo Processors

Stereo processors can be added to your system at any time for stereo sound on many of your favorite satellite TV channels, including Music Television (MTV), The Movie Channel, The Arts and Entertainment Network, Bravo, ESPN, The Home Theater Network, Country Music Television, The Disney Channel and the Nashville Network. You will also find that most satellite-relayed radio stations broadcast their services in stereo as well.

Satellite services use three stereo formats for transmitting stereo signals: these are called "matrix", "discrete" and "multiplex stereo". For stereo reception of all the satellite services which broadcast in stereo, your stereo processor must be able to deal with all three formats. To receive

A stereo processor.



How to connect a stereo processor to your satellite receiver.

matrix or discrete stereo, you must adjust two knobs—one for the left stereo channel and the other for the right. Multiplex stereo tuning can be done with a single adjustment.

Most stereo processors offer a choice between wide or narrow audio filters. In most cases, the processor will deliver the best audio fidelity when the wide audio filter is used. If the audio has an undesirable hiss or noise, the narrow audio filter should reduce or even eliminate the problem.

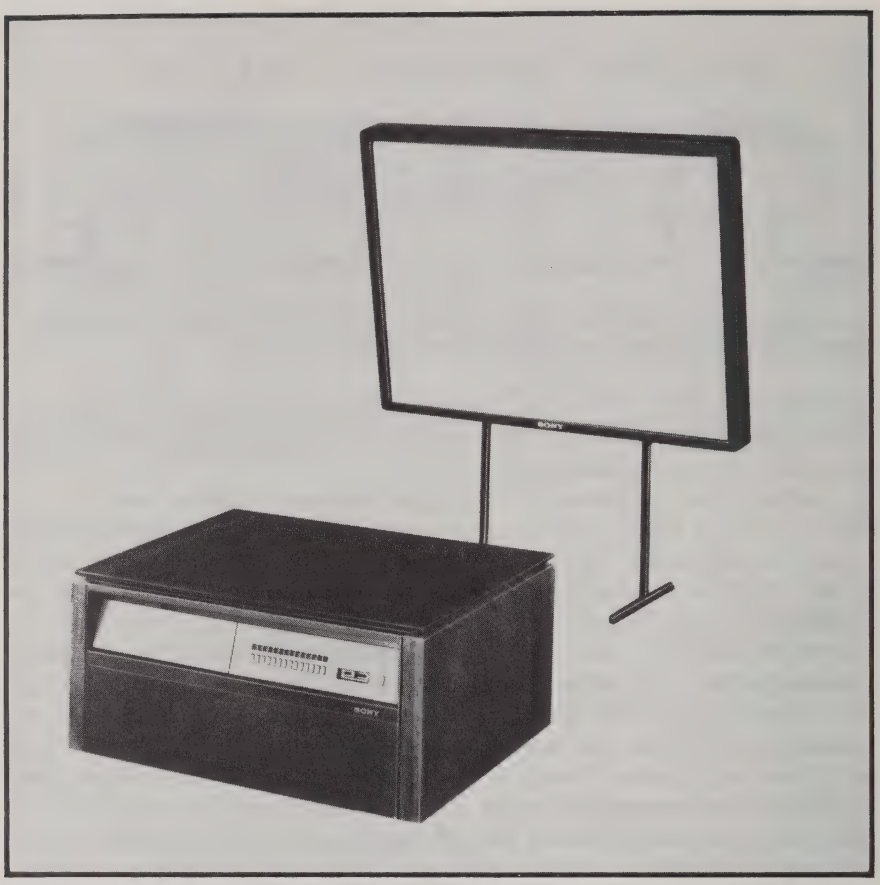
A shielded hi-fi cable connects the stereo processor to your system. One end of the cable plugs into the composite video jack on the back of your satellite receiver; the other mates with the input port of the processor. While a few stereo processors come with built-in audio amplifiers and speakers, most of the models currently available must be used with your stereo system or a stereo television set. A stereo hi-fi patchcord connects between the left and right channel outputs of the processor to the left and right audio input jacks on your stereo's amplifier.

Large-Screen Projection TV Systems

With a projection TV system you can watch your favorite satellite programming on a giant screen that is several feet wide. Some systems can even project the TV image directly onto the wall of your living room. While most projection units do not achieve the same picture clarity as regular TV sets, they make up for it with their screen size; they are particularly well-suited for viewing by large audiences.

Buying a projection TV set is a major investment, often costing as much as a satellite TV receiving system. Be sure to select an appropriate screen size for your situation. If the projection TV is going into a small room, you should probably get one of the smaller screens. Otherwise you may end up feeling that your home has been taken over by the overpowering presence of the giant screen.

Most of the cheaper large screen TV systems use a single lens to project the video onto a screen; the images do not have the detail or clarity of the higher-priced models. The more expensive projection TV systems



Large screen projection TV.

use separate lenses for the green, red and blue color components of the video. The three separate color images generated by this type of projection TV are recombined onto the screen, producing sharper images along with improved picture detail.

Earth station owners should get a projection TV system that has video and audio inputs in addition to the standard TV antenna leads found on regular TV sets. By connecting the video and audio outputs of the satellite receiver directly to the projection TV, you will get the best possible video performance from your home entertainment system.

Video Monitors

Unlike your TV set, a video monitor has no channel selector for changing channels and isn't capable of tuning into your local TV stations or cable TV services. Instead, the video monitor directly displays any video signal that is plugged into it. Video monitors are often used with video

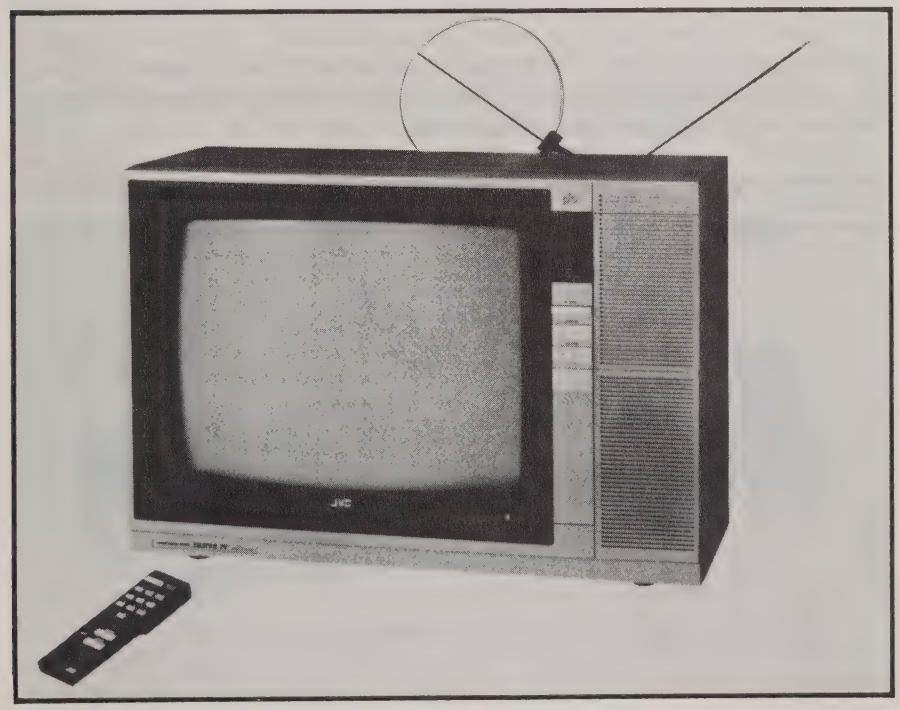
cassette recorders, computers and satellite TV systems because they deliver sharper, higher-quality pictures than the average TV set. To feed a satellite TV signal to a monitor, all you have to do is connect the video and audio outputs on your satellite receiver to the corresponding inputs on the TV monitor.

Video Cassette Recorders

Video Cassette Recorders (VCR) have recently become the rage. Now that a recent U.S. Supreme Court decision has legitimized home taping of television programs, more and more people are considering buying a VCR for their home entertainment system. By the end of 1984, more than 20% of all American households will have a video cassette recorder.

There are two kinds of home video cassette recorders available today. The "Betamax" format was originally introduced by Sony. An alternative to the Betamax, the "VHS" (for Video Home System) video cassette recorder was developed by JVC and popularized in the U.S. by RCA. You cannot use a VHS tape on a Betamax machine, or vice versa, since the two systems are mutually incompatible. The main difference between the two systems has to do with the number of hours of programming which can be recorded on a single cassette. Beta machines can record up to three hours and twenty

19-inch video monitor with full function remote control.



Betamax format recorder.

minutes of TV on a single cassette, while the more expensive VHS machines can record up to eight hours of programming on an individual tape. Because the two formats are incompatible, you might want to get the one that matches what your friends, relative or neighbors have, so you can exchange video tapes with them.

VCRs come with between two and five video "heads". These heads put the video images onto the tape during recording, and retrieve the stored information from the tape during playback. The more heads a machine has, the higher its price tag. The video quality of special effects like freeze frame, slow motion or fast picture scan is noticeably better on machines with multiple recording heads.

VHS format recorder with separate programmable timer and recorder units for easy portability.

VCRs can be programmed to automatically tape shows from your satellite TV system, even when you are not at home. The simplest VCR can automatically record a single TV program, while more expensive units can be instructed to tape several programs in the course of a couple of weeks. Once the dates and times for each TV show have been entered into the VCR's memory, it will automatically switch to the record mode at the preselected times. By getting a VCR that can tape several programs, you can still catch your favorite satellite TV shows while you're out for the evening or away on vacation. Video cassette tapes can be viewed once and them reused for recording other programs, or become part of your home video library.

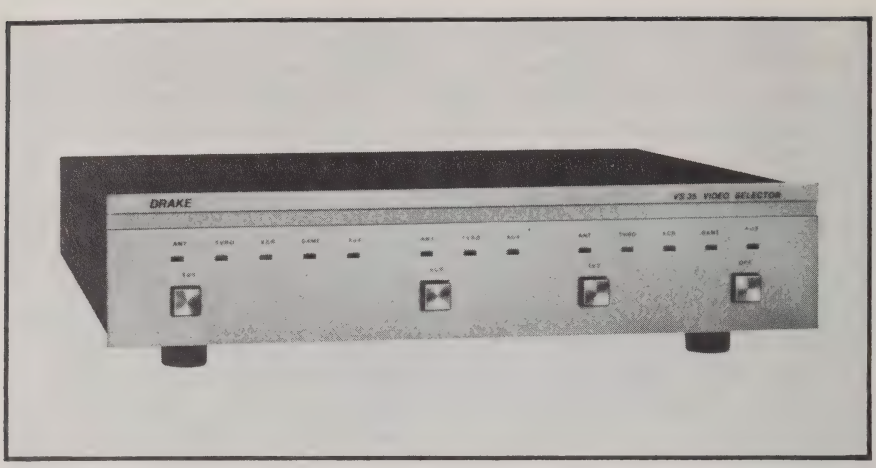
You can also use a video cassette recorder to tape one program while watching another. Those people who are blessed with good local TV reception can have their cake and eat it too. When one of the networks has a good program scheduled at the same time as one of your favorite satellite TV shows you can use the VCR to tape one at the same time that you are viewing the other.

Many VCR's have optional features that you might find useful, including wireless remote control and stereo recording capabilities. Stereo is especially attractive to satellite earth station owners, since it lets you tape your favorite movies, sporting events, or music videos in full stereo sound.

Home Computers and Your Earth Station

The personal home computer is another electronic gizmo that is becoming more and more popular these days. While many computers are being purchased for their video game capabilities, they can also be put to many other uses. A few companies have even come out with plug-in modules that let you hook your home computer to your satellite receiving system. With one of these modules, your home computer can be programmed to serve as the central brain for your receiver and antenna motor drive. There are now add-on modules available for Atari, Commodore and Texas Instrument personal computers.

When your satellite receiving system has its own brain, satellite navigation is a cinch. All you do is key in the satellite and channel that you want to watch and the computer will automatically adjust the antenna, tune the channel selector and audio control to the correct settings, choose the right polarity for the satellite being viewed, and automatically fine-tune for the best possible reception. In many cases, the computer will also have a complete satellite "menu" in its memory; then the channel program lineup for each satellite can be displayed right on the TV screen. A few computerized systems can even be preprogrammed with an entire evening's entertainment. At the appropriate times, the system automatically resets itself for the next satellite and channel on that evening's schedule. All you have to do is turn on the TV set, sit down, and enjoy.



Video switcher.

Stay Ahead of the Joneses with a Video Switcher

Once you have added a collection of new video gadgets to your home entertainment center, you'll need a video switcher to simplify changing from one entertainment source to the next. A wire cable runs from each component in the system to the video switcher. By pushing one of the buttons on the switcher's front panel, you can connect your TV set to the home computer, the satellite TV receiver, the video cassette recorder, the off-the-air TV antenna, or your local cable TV service. Many of these video switchers have a separate section that lets you connect any of the program sources to the video cassette recorder for taping.

Descramblers to Unscramble the Scramblers

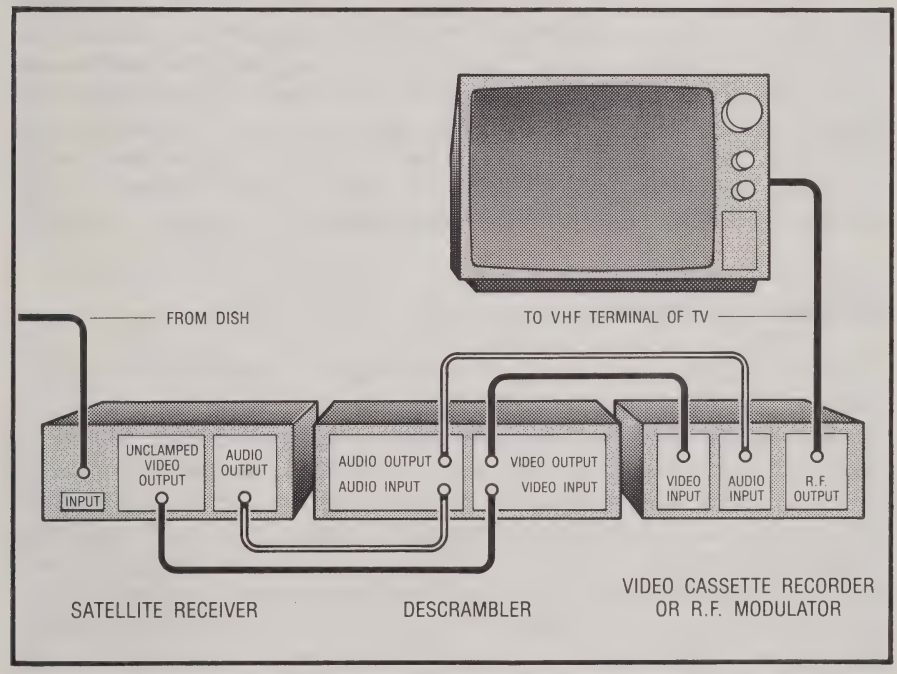
Most satellite TV channels are transmitted in the clear, but a few program services scramble their signals. Scrambling is an electronic means of encoding the audio and video portions of a TV program so that they are unintelligible to those who have not paid for the programming. Each authorized subscriber gets a device called a descrambler that decodes the signal and displays it on a standard TV set. Some descramblers are even individually-addressable, which means that the program suppliers can turn off any descrambler by making tiny changes in the encoding. If you don't pay your monthly subscription fee on time, they can turn your descrambler off, rendering it totally useless.

To subscribe to encoded services, you pay a monthly subscription fee, along with a lease fee for the use of the decoder. Several program services provide decoders to earth station owners; others may do so in the near future. CANCOM — the Canadian Communications Company — has numer-

ous satellite TV subscribers throughout North America. A CANCOM descrambler gives you access to an additional seven channels of satellite TV. Two XXX-rated adult program services—Fantasy and The Pleasure Channel—are also offering their programs to satellite TV subscribers. The names, addresses, and telephone numbers of these scrambled satellite TV services can be found in the appendix.

Only satellite TV receivers that have an unclamped video output can be connected to a descrambler (sometimes, this is called "raw video" or "composite video"). If your receiver does not have an unclamped video output, your local satellite TV dealer can often add one for you. In a few cases, the receiver's audio output must also be unprocessed for the descrambler to decode the encrypted audio signals. Many receivers provide an unprocessed audio output for connection to a stereo processor. If not, your local satellite dealer can probably add one for you.

How to attach a descrambler to your satellite receiver.



Cable TV Accessories

Since most homes have more than one TV set, you may want to connect your satellite TV system to TV sets throughout the house. If your home doesn't already have a cable distribution system, it's not very hard to add one. All the parts can be obtained at your local Radio Shack or electronics supply store.

Hooking Two or More TV Sets to Your Satellite TV System

Your satellite TV receiver normally puts out a standard TV signal via its RF output jack; this signal is connected to the antenna terminals of your TV sets via a special type of wire called coaxial cable, (or "coax"). The type of coax cable recommended for cable TV use is "RG-59/U". It comes in various standard lengths and can be purchased with the connectors already installed on each end. To connect two or more TV sets to your satellite receiver, you must divide the output signal so that separate coax cables can be plugged into each set. An inexpensive device called a "signal splitter" is made just for this purpose. The signal splitter has one input connector and two or more output connectors. A short cable connects the satellite TV RF output jack to the splitter's input. One of the output cables on the splitter can deliver a signal to the TV set in the living room while others can feed different sets around the house. The connecting cables can either be hidden under the rug or fastened to the baseboard. If the incoming signal is split too many times, or if the lengths of cable between the TV sets and the receiver are too long, the strength of the signal may be reduced substantially, lowering the quality of reception. An inexpensive distribution amplifier in the system will more than compensate for any signal losses. Connect the output of the satellite receiver to the input of the distribution amplifier, and the output of the distribution amplifier to the signal splitter's input tap. The distribution amplifier will need to be plugged into an AC outlet, since it needs electricity in order to operate.

Filtering Out Trouble

Several different filters can be added to any satellite TV system to reduce or eliminate certain kinds of reception problems.

Microwave filters In crowded urban or suburban areas, telephone relay stations may interfere with satellite reception. The same frequencies used for transmitting satellite TV programs are also used by your local telephone company to relay telephone conversations from your home town to other cities. If the path of Ma Bell's signals crosses through your yard, they can wreak havoc upon your satellite TV reception. This interference appears as intermittent noise in the video, usually affecting specific channels on certain satellites. When the interfering signals are strong, some satellite channels can be blacked out entirely. The interference will usually be at its strongest during peak telephone hours, tapering off to lower levels during other parts of the day.

Several companies make microwave suppression filters to help solve this problem. These filters require no operating power and come with standard ''in'' and ''out'' connectors so that they can be easily connected between your system's downconverter and receiver. These filters will ''notch'' out the interfering telephone signal, while passing most of the

Before and after photos showing strong microwave interference removed by a band-pass filter.

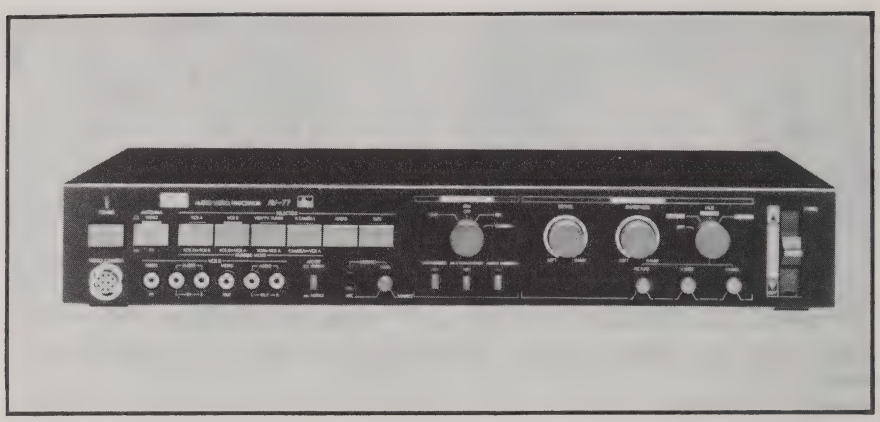
satellite TV signal on to your receiver. There are two kinds of filters; one reduces interference in the upper half of the affected channel and the other decreases interference in the lower half.

With severe microwave interference problems, using one or even both of these filters may not be enough. Many times, the dish will have to be moved to another part of the yard. Sometimes the best solution for interference problems is to make shields out of screen and position them so they will block out incoming telephone signals while allowing satellite signals to get through. Your local satellite TV dealer should be able to help you eliminate microwave interference problems if they begin to affect your satellite TV reception.

Threshold extension filters. Another kind of filter that can help improve satellite TV reception is the threshold extension filter, sometimes called a "sparklie remover" or "eliminator." Some of the weaker channels in a satellite system may have small amounts of impulse noise—or sparklies—which appear in the video picture. This is often caused by using too small a dish for the particular area. When there are only a few sparklies in the picture, one of these filters may eliminate their presence entirely; when the amount of noise in the video is more substantial, the threshold extender will only reduce the amount of noise but not remove it entirely. Like microwave filters, the threshold extension filter is easy to install between the downconverter and the receiver.

Video Processors and Image Enhancers

Video processors have been a long-time favorite of video recording enthusiasts because they can sharpen drab-looking video signals, boost picture detail, remove video noise and enhance the flesh-tones and color hues of just about any video signal. A video processor is especially useful for taping video programming from the satellites, providing satellite TV enthusiasts further control over the quality of incoming signals.

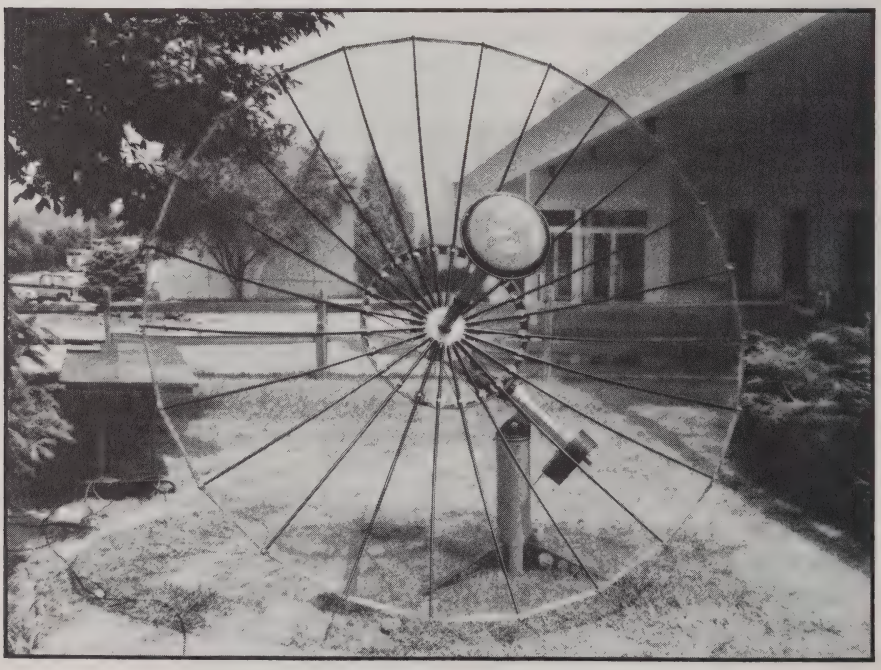


Video processor.

You Can Take It With You

Many owners are so enthusiastic about their earth stations that they have figured out how to take their systems with them when they are traveling. Some RV (recreational vehicle) owners bring along the electronics portion of their home satellite TV system and hook it to a collapsible antenna that folds up like an umbrella for easy storage. While

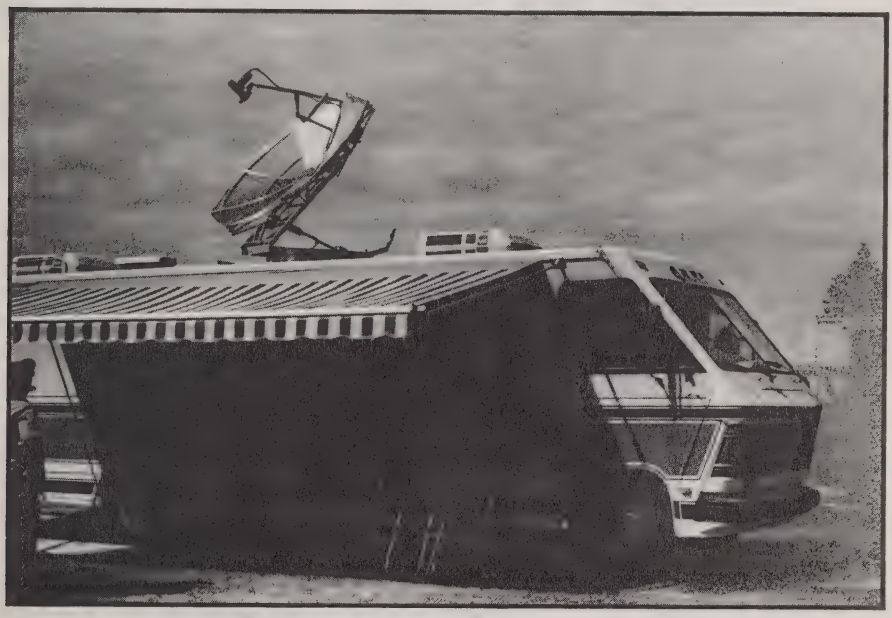
This 6-foot antenna collapses like an umbrella for portability.



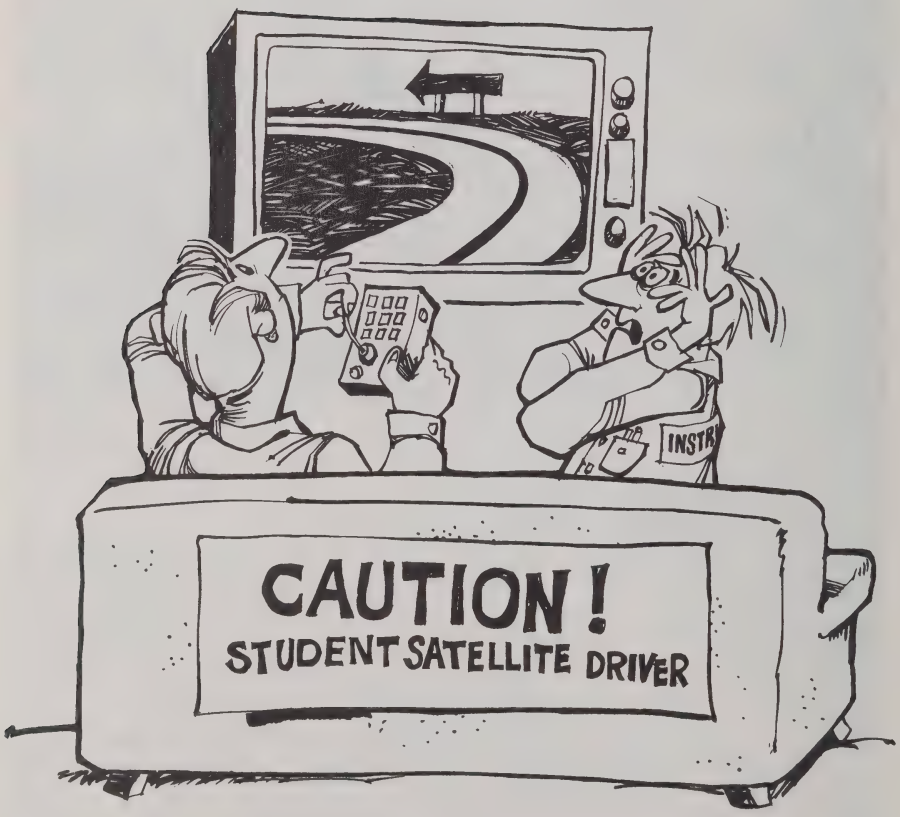
this is one way to watch satellite TV on vacation, it takes extensive work assembling the antenna and aiming it at the satellites.

One manufacturer has come up with a six-foot dish that mounts onto the roof of an RV. When traveling, the dish lies flat against the roof. When the RV is parked, a motor drive system can raise the antenna to its operating position. With this system there is no need to keep connecting and disconnecting the electronic components every time the RV moves. However, the RV owner still has the problem of aiming the antenna at the satellites from each new location. The motorized RV antenna package allows just about anyone to receive satellite TV on the road, after a few dish pointing lessons.

A satellite antenna system installed on an RV.



Part Three: Satellite Operators Handbook or Learning How To Do It Without the Usual Hassle



7 • Navigating the Satellite Superhighways

Once your satellite receiving system has been installed, you'll need to learn how to maneuver your dish from one satellite to the next. The technicians will probably leave your system pointing at either Satcom F3 or Galaxy G1—the crown jewels of cable TV. While these two satellites carry a rich collection of video channels, there's also a lot available from the other satellites. You'll need to learn a few basic procedures in order to navigate your way along the satellite superhighways.

Aiming Your Dish by Hand

If you have a hand-cranked antenna, pointing your satellite dish is a relatively straightforward procedure. When installing your satellite system, the technician can mark each satellite on the crank's arm with paint or a waterproof pen. These can be color-coded so you can easily identify the correct position for each satellite. The main disadvantage of manually repositioning the antenna is that it takes a while to move from bird to bird. However, if you are primarily interested in the cable TV programming carried by Satcom F3 and Galaxy G1, a hand-cranked system should be adequate for your needs.

The Acme — Motorized Positioning

Anyone who wants a quick and easy way to get the full spectrum of available satellite TV programming will get a motor-driven antenna that can be operated from inside your house. Some of the less expensive systems have a simple east/west switch that controls the antenna's motor. A more sophisiticated package would also have a digital readout of the antenna's position. In either case, the operator still must direct the antenna's movement from one satellite to the next. This can get tricky, especially when you have never steered one before. While it's not nearly as difficult as driving a car, you still need to know where you are going if you want to arrive on time. The following chart will serve as your road map to the main thoroughfares of the satellite superhighways.

If all the channels on every satellite were active 24 hours each day, steering your dish from one bird to another would be fairly simple. You could set your receiver on any channel and move the dish to the east or

west until a picture popped into view on your screen, signaling your arrival at the next satellite in line. Unfortunately, only Satcom F3 and Galaxy G1 have most of their 24 channels active at any one time; the rest have less than half of their channels on regularly, many on a non-scheduled, part-time basis.

However, certain channels are active on a majority of the satellites. From our roadmap, you can see that channels 11, 15 and 23 are in constant operation on many of the satellites. One easy way to cruise through the satellite belt would be to select one of these highly-active channels as your roadway. When the dish passes by a satellite that's using the selected channel, a TV picture will pop into view. Even if that particular channel is not one that you want to watch, it can be a signpost— a reference point that helps you identify the satellite being received. Once you have arrived at the satellite you're looking for, you can switch to the channel that you actually want to watch.

Satellite Designations

You may have been wondering about satellite designations like F3, D4 and G1. Since each satellite manufacturer has more than one bird in its fleet, these designations are used to identify which individual satellite we are talking about. Otherwise if we said that a particular program was on Satcom, you wouldn't know which Satcom satellite we were talking about. Besides a numerical designation, each type of satellite has its own distinctive letter abbreviation. By getting to know these abbreviations, you will be able to understand the satellite program listings that are included in most of the satellite TV program guides.

SATELLITE DESIGNATION CHART

SATELLITE	POLARITY FORMAT
SATCOM F1, F2, F3, F4, F5 (also known as Aurora)	odd: V; even: H
WESTAR W2, W3	odd: H
WESTAR W4, W5	odd: H; even: V
COMSTAR D1, D2, D3, D4	odd: V; even: H
GALAXY G1, G2, G3 (1985)	odd: H; even: V
TELSTAR 301, 302 (1985)	odd: V; even: H
SPACENET S1, S2 (1985)	odd: H; even: V
ANIK B	odd: H
ANIK D1, D2 (1985)	odd: H; even: V

odd = odd numbered channels; even = even numbered channels
H = horizontal polarity; V = vertical polarity

Signal Polarity

Polarization techniques enable satellites to carry 24 channels of television within the limited frequency spectrum allocated by the government for satellite communications. By using dual polarities, channels of opposite polarity can overlap each other without interference. Only when your system has been precisely tuned to the correct polarity will you be able to get the best reception. If you adjust the polarization to a setting midway between horizontal and vertical, you can even watch the two TV signals at once, with one on top of the other.

Whenever your system is adjusted to receive horizontally-polarized channels, vertically-polarized TV signals will only appear on your TV screen as faint ghosts if they are visible at all. Most of today's receivers automatically set the polarity when you switch channels. The only time you need to consider polarization is when you are redirecting the dish to another satellite.

Westar, Spacenet, Anik and Galaxy satellites all use the same polarization scheme: even-numbered (2, 4, 6, 8, etc.) channels are vertically-polarized, while odd-numbered (1, 3, 5, 7, etc.) channels use horizontal polarization. Satcom, Telstar, and Comstar satellites are just the opposite, using horizontal polarization for the even-numbered channels and vertical polarization for the odd-numbered ones. Before you move the dish from one type of satellite to the other, you will need to switch polarity formats so your system will be ready to receive the TV channel you are looking for.

Some systems have a separate hand-held polarity control. On these, the receiver will not automatically change polarity when you switch from a horizontal to a vertical channel. Some of the hand-held polarity controls have a switch that must be thrown each time you change from one set of channels to the other. A second type has a knob or momentary-on switch that you must manually tune to get the correct polarity.

If your system has a tunable polarity control, you will need to use a slightly different procedure in maneuvering the dish from one type of satellite to the other. Before moving from channel 23 on Satcom F3 to channel 23 on Galaxy G1, for example, you should adjust the polarity control until the signal from Satcom F3 dissapears. By "nulling out" the Cinemax feed on channel 23 of Satcom F3, you will have tuned your system's polarity to receive channel 23 on Galaxy G1.

Adjusting the Skew

The polarization must be fine-tuned whenever the antenna is moved from one satellite to another. Of course, "horizontal" and "vertical" are only relative terms. The exact alignment of the receiving system for horizontal or vertical polarities will vary slightly from satellite to satellite.

Some form of "skew" control is designed into every satellite TV system, so you can compensate for these minor variations in polarity. This skew control should be adjusted for the best video reception possible.

Using the Signal Strength Meter

When cruising the satellite superhighways, it's a good idea to keep an eye on the receiver's "dashboard." Most systems have a "signal strength meter"—sometimes called an "S" meter—on its front panel. This meter provides you with a visual indication of the relative strength of the incoming TV channel that is far more accurate than you can get by just watching the incoming video picture. Using the antenna positioner's east/west control, you can move the dish back and forth until the maximum reading on the "S" meter is achieved. Be sure to check the meter reading when adjusting the polarization skew control as well. This will tune your system for best reception of all the other channels on the same satellite.

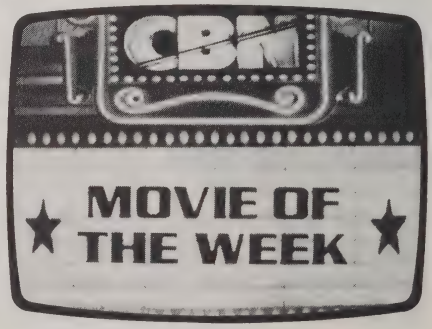
Many receivers will come with a "center tune meter." This indicates whether your receiver has been fine-tuned to the center of the satellite TV channel.

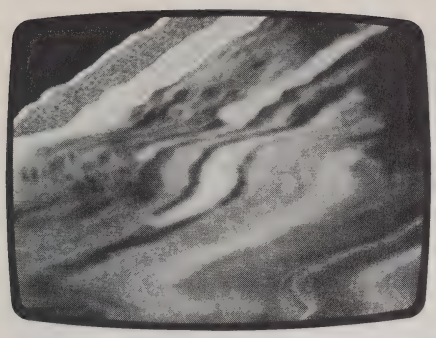
Moving the Dish for the First Time

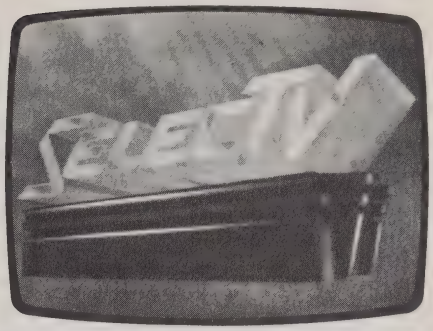
Now that we've covered the basic points of antenna navigation, it's time for your first cruise through the satellite universe. If your satellite installers left your dish pointing at Satcom F3, adjust your receiver's channel selector to channel 11—the home of MTV (Music Television).

We'll start by moving the dish to Galaxy G1, which lies immediately to the west of Satcom F3. First of all, you will need to switch the polarity format of your receiver, since Galaxy's polarization scheme is opposite that of the Satcom satellites. Then move the dish to the west until the next channel pops into view on your TV set. Here we are at the CBN Cable Network. Move the dish slightly—first in one direction and then the

MTV © on channel 11 of Satcom F3; CBN © on channel 11 of Galaxy G1.







ON TV © (scrambled) on channel 8 of Comstar D3; Selec TV © on channel 13 of Comstar D3.

other— while keeping an eye on the signal strength meter; stop the dish when you get the maximum signal level possible. Now adjust the skew control for that extra notch or two of signal. There, now wasn't that easy?

Galaxy G1 has a full slate of cable TV services, including HBO, The Nashville Network, The Disney Channel, Cinemax, The Movie Channel, CNN and Superstation WOR. But let's move on so you can see what its like to push that big dish around.

To the west of Galaxy G1 are two other satellites, Satcom F1 and Aurora, but neither of these birds carries much in the way of video. Aurora has educational TV programming and selections of network TV for rural communities in the Alaskan wilderness; the satellite's footprint is centered on Alaska and not the continental U.S., so the reception quality here is not very good. Most of Satcom F1's channels are used to relay radio programming for America's major radio networks. You'll only find a couple of active TV channels on it.

So, let's head back east. Keep the receiver on channel 11 and move the dish back to Satcom F3. Don't forget to switch polarity formats before moving the dish. Before you get involved in watching the latest music video or one of Satcom F3's other 23 channels, let's move on to Comstar D4, the next bird in line to the east. Comstar satellites have the same polarization scheme as Satcoms do, so we don't have to switch formats. Adjust the channel selector to channel 13 and move the dish until you find video. Channel 13 on Comstar D4 is occupied by SelecTV, a premium movie and entertainment service.

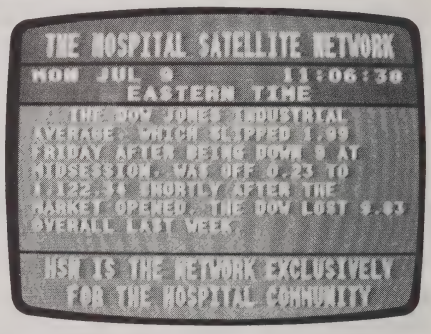
Don't forget to watch the S-meter reading when adjusting the antenna position and skew controls. Once the system is fine-tuned, you could move on to one of the other active channels on this satellite. Before you get engrossed in some movie or special, let's continue with your maiden journey by moving on to the next satellite, Westar W5. Move your receiver to channel 11 and we're off!

The polarization scheme for the Westar birds is opposite that of Comstar D4, so you'll need to change polarity formats before repositioning the antenna. Channel 11 on Westar W5 will either be carrying a "Group W"

color bar pattern or a feed of news or sports video for one of Group W's customers. Several channels on this bird also broadcast a set of Group W color bars; these channels are dedicated to relaying news feeds and major league sporting events. Other channels are occupied during the late evening hours with X-rated adult program services. While Westar W5 used to be loaded with cable TV services, many of them have moved to Galaxy G1. Still, I find Westar W5 an interesting stop-off point; you never know exactly what you're going to find over here.

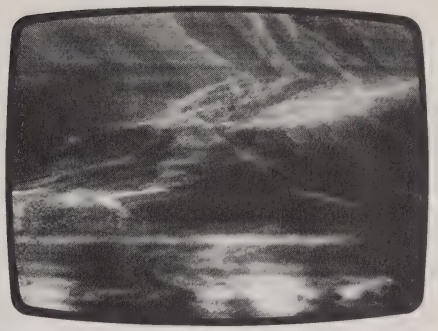
The next satellite on our journey is Spacenet I, which uses the same polarity format as Westar W5. Channel 11 on Spacenet is used by HSN (Hospital Satellite Network) to broadcast late-afternoon and evening entertainment service to participating hospitals throughout the United States. Spacenet is a recent addition to the Clarke Belt, and currently has only a few active TV services. So let's move on again to Anik B, the next stop on our journey.

Group W © color bars on channel 11 of Westar V; HSN on channel 11 of Spacenet I.



Canadian Anik satellites also use the polarity scheme adopted by Galaxy, Westar and Spacenet satellites, so there's no need to switch formats during this leg of the trip. Channel 11 on Anik B is used by CBC (Canadian Broadcasting Company) for the Pacific Coast edition of their national TV service. Several other channels on this bird are used by the CBC to relay both French and English editions of their program service to various regions of Canada.

At this point in our satellite-hopping expedition, we need to make a decision. The next five satellites on our tour use channel 11 only sporadically, for relaying news or sports feeds. Those of you who are primarily interested in cable TV programs could quickly zip through the next few birds and head straight for Satcom F4. Channel 11 on Satcom F4 is occupied during the evening hours by HSE (Home Sports Entertainment) regional network based in Houston, Texas. For those who are interested in feeds of network news, sports and entertainment programs to affiliate TV stations across North America, we are going to jump around, hitting at least one active channel on each of the next few satellites.



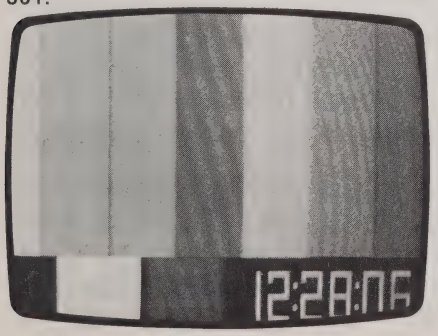
CBC © on channel II of Anik B1; scrambled signal (WJBK © Detroit) on channel 23 of Anik D1.

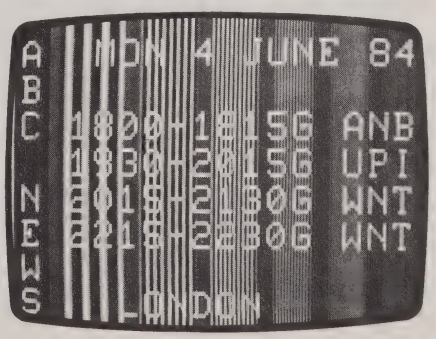
The next satellite in line is Anik D1. It has the same polarity scheme as Anik B, so no change in format is necessary. Eight of Anik D1's channels are scrambled; they carry the full-time programming of Canadian Super Stations and three TV stations out of Detroit. Let's switch the receiver to channel 23 and cruise eastward until we run into some of that mixed-up video.

If you want to be able to decode any of Anik D1's scrambled channels, you can subscribe to CANCOM (the Canadian Communications Company). Leasing a CANCOM decoder involves paying a monthly subscription fee; CANCOM will send you a special descrambler box that goes between the satellite receiver and your TV set. We supply the address of CANCOM at the back of the book, as well as addresses of other program suppliers who offer their services in return for a monthly subscriber fee.

To the east of Anik D1 is Westar W4. Since Anik and Westar birds use the same polarity scheme, no change in format is necessary. So select channel 15 and move the dish on over. Channel 15 is one of four channels on Westar W4 that are used by PBS to relay programs to its affiliates. Channel 15 should be airing an educational program or a set of color bars. Other channels on this satellite are used for the occasional news feed or sporting event, or even teleconferences between major corporations and their stockholders and employees.

PBS color bars on channel 15 of Westar IV; ABC News feed on channel 10 of Telstar 301.



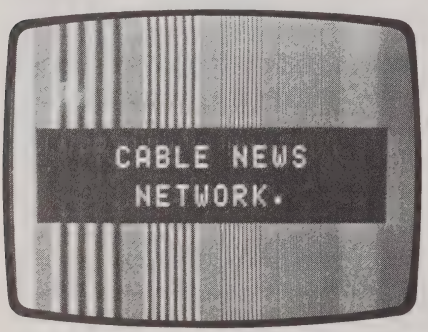


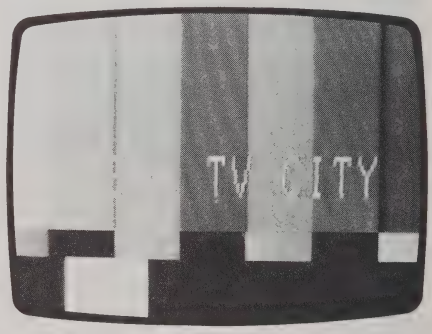
Coming up next is Telstar 301; you'll need to change polarity before moving from Westar W4 to Telstar. Channels 10 and 12 here are occupied by ABC network program feeds or an ABC test pattern. Additionally, two channels on Telstar are leased by Wold Communications to relay independently-produced TV programs like *Fame, Entertainment Tonight,* and the *Merv Griffin Show* to independent TV stations nationwide.

Further to the east is W3, which only shows a few channels, and those on an irregular basis. All Westar III channels are horizontally-polarized. Channel 5 is the most active channel; CNN uses it to link bureaus in New York, Chicago, and elsewhere with their main studios in Atlanta. Channels 19, 21, and 23 are also used occasionally to relay news feeds or sports events.

Comstar D3 is the next bird on our agenda. Before moving the dish, you'll need to change polarity formats and select either channel 10 or 17, which carry the only active TV signals on Comstar D3. Both of these channels are used by CBS for feeding affiliate stations their regular evening program lineup as well as CBS news items for news bureaus throughout the nation. CBS plans to eventually move its network TV feeds to a new satellite in 1985.

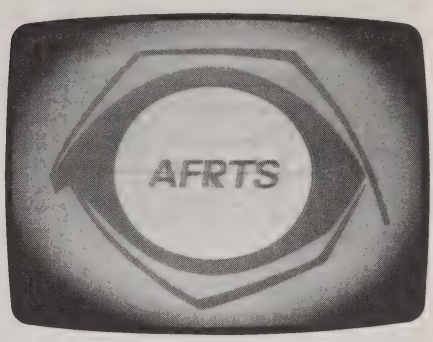
CNN news feed on channel 5 of Westar III; CBS program feed on channel 10 of Comstar D3.





Our final destination on this particular trip is Channel 17 on Satcom F4. It is occupied by the TBN (Trinity Broadcast Network)—a religious program service. TBN can serve as another convenient signpost for identifying this satellite as Satcom F4. From this channel you could switch to any of Satcom F4's other active channels, from Bravo and SPN(Satellite Program Network) to SuperStations WPIX and KTVT, and Hugh Heffner's Playboy Channel.

There are four additional satellites located east of Satcom F4, but there is little in the way of TV programming to be found there. Only Satcom F2 carries a full-time video service; AFRTS (Armed Forces Radio and Television Service) occupies channel 20 on Satcom F2. The other birds in between Satcom F4 and Satcom F2 are filled with telephone and data



TBN on channel 17 of Satcom F4; AFRTS on channel 20 of Satcom F2.

communications traffic. On rare occasions, they are also used to relay a news or sports feed for one of the networks. If you were hunting around for a particular sporting event, you might take a look at these satellites as a last-gasp effort before giving up.

While the above-mentioned satellite TV channel lineups correspond to the state of affairs in late 1984, changes will likely occur in the months and years ahead. Readers who want to stay informed of satellite channel changes can subscribe to one of the satellite TV program guides. A list of program guides appears in the appendix.

What To Do if You Get Lost: Using the Receiver's Scan Feature

Once you have gotten the hang of it, you can speed up the satellite switching process by skipping through the satellites which are between your program destination and the satellite you are now watching. If you get lost on your journey down the satellite superhighways, don't panic! Most receivers have a scan function that lets the receiver quickly tune through all 24 channels. If you ever get lost, switch the scan control on and move the antenna to the east or west until your TV set begins to flicker with bursts of incoming video. Turn off the scan control, select an active TV channel, and then fine-tune the east/west position and skew controls for best reception. Then you can tune through the active channels, looking for signpost services that will identify the satellite. Once you have gotten your bearings, continue on your way with confidence.

The scan feature can also be used as a navigational aid for steering your dish across the skies. If you know which satellite is your starting point, you can select the appropriate polarity format for the next satellite in line, activate the scan control, and move the antenna until a video signal appears on your TV. Then you can turn off the scan control and fine-tune the east/west antenna position and skew controls for maximum signal reception.

	SATCOM F2 72 W.	GALAXY G2 74 W.	COMSTAR D1-2 76 W.	WESTAR W2 79 W.	SATCOM F4 83 W.	COMSTAR D3 87 W.	WESTAR W3 91 W.	TELSTAR 301 96 W.	WESTAR W4 99 W.
1									
2									
3									
4									
5							CNN		
6									
7									
8									
9									
10						CBS		ABC	
11									
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23									
24									

These "signpost" stations mark the locations of the satellites for your trip through the Clarke Belt starting at MTV on channel 11 of Satcom F3.

	ANIK D1 104.5 W.	ANIK B1 109 W.	SPACENET S1 121 W.	WESTAR W5 123 W.	COMSTAR D4 127 W.	SATCOM F3 131 W.	GALAXY G1 134 W.	SATCOM F1 139 W.	AURORA F5 143 W.
1									
2									
3									
4									
5									
6									
7									
8								NBC	
9									
10									
11		CBC North	HSN	Group W		MTV	CBN		
12									
13					SelecTV				
14									
15									
16									
17									
18									
19									
20									
21									
22									
23	WJBK Scrambled								
24									

Using a Computerized Dish Aimer

Satellite dish navigation is much easier when your system comes equipped with its own electronic brain. That's just what you are getting when you buy a microprocessor control for your antenna motor. Once you have keyed in the code for the satellite you want, you can lie back while your robot chauffeur steers the dish for you. Some computerized dish aimers will even automatically select the appropriate polarization format for the new satellite and adjust the skew as well.

On occasion, a computerized dish aimer will lose its memory, usually as a result of a power failure. Then you will need to reprogram the unit's memory from scratch. All microprocessor-based dish controllers also have an east/west control that will let you steer the dish yourself. To reprogram the positioner's memory, you will have to pinpoint each satellite and enter its program code into the memory. Keep the controller's manual in a safe place so you can get your hands on the correct programming sequence in case your system ever develops amnesia.

Advanced Satellite TV Navigation

Once you have cruised through the available satellites a few times, you will find that it gets easier to find your way around. By subscribing to one of the satellite TV program guides, you can get an hour-by-hour listing for many of the cable and network TV programs now transmitted by satellite. But there will always be many channels that can't be found in anyone's program guide. To get the most from your satellite TV system, you'll need to learn how to track down exotic sports and news feeds transmitted by satellite channels that are activated on a non-scheduled part-time basis.

The Satellite Sports Extravaganza

More than 60% of all major league baseball, football and basketball games can now be seen by anyone with a satellite receiving system. On many weekends there are as many as 40 channels of sporting events to choose from. You can watch both the "home" and "away" games of your favorite sports teams, once you learn where to look for them. WPIX-New York City, WOR-Secaucus, New Jersey, WTBS-Atlanta, WGN-Chicago, KTVT-Dallas, and WDIV-Detroit are satellite Super Stations that transmit the games of sports teams from their areas. If none of the teams from these cities strike your fancy, you can still tune in whenever your favorite teams are playing. Fans of the Toronto Blue Jays or Montreal Expos baseball

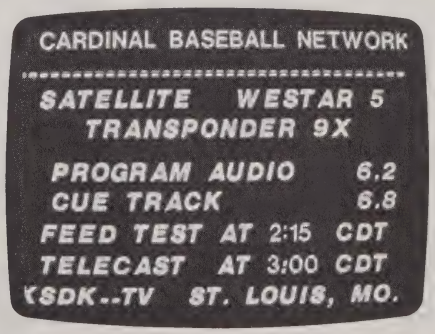
teams are often rewarded when flipping through the CBC-TV channels on Anik B. If none of the Super Stations are carrying the game you want to see, you can check out the various cable TV sports networks. ESPN is the only 24-hour-a-day national cable sports network. Many other regional sports networks transmit games during the evening hours and on weekends. These include: HSE (Home Sports Entertainment), PASS (Pro-Am Sports System), Sports Time, Sports Vue, The Madison Square Garden Sports Network, HTS (Home Team Sports), Sportsvision, and NESN (New England Sports Network). There's a good chance that you'll find what you are looking for on one of these.

If none of these channels is airing the sporting event you want, don't give up—there are plenty of other places to look. Many channels transmit sports events on a non-scheduled, part-time basis. Every weekend, the major broadcasting networks use satellites to transmit several games simultaneously, so their local affiliates can choose the game that most appeals to their audience. Many metropolitan TV stations also use satellites to relay the road games of the city's professional sports teams back to local viewers. You will run into many of these sports feeds during the evenings or on weekends.

The following Sports Channel Chart shows which satellite TV channels are regularly used for sports transmissions. Your local newspaper's sports section can give you a schedule of the major sporting events of the day, complete with starting times. Begin looking for a particular game about 15 minutes prior to game time. Tune through the channels listed on our chart, until you locate the game you want to see. Before the game, there is often a test pattern on the channel that will tell you which game is coming up.

You may find that the same game will be on several satellite channels simultaneously. One recent baseball game between the New York Yankees and the Detroit Tigers appeared on ABC, The Pro Am Sports Service, AFRTS (Armed Forces Radio Television Service), Super Station WPIX, and WDIV Detroit. Whenever multiple feeds of the same event occur, you even get to choose between sports announcers.

Sports Time on channel 4 of Satcom F3; Cardinal Baseball Network on channel 9 of Westar V.



Sports Grid [as of Nov. 1st, 1984]

	SATCOM F2 72 W.	GALAXY G2 74 W.	COMSTAR D1-2 76 W.	WESTAR W2 79 W.	SATCOM F4 83 W.	COMSTAR D3 87 W.	WESTAR W3 91 W.	TELSTAR 301 96 W.	WESTAR W4 99 W.
1					o/v Sports	o/v Sports			
2								o/v CBS Sports	
3				o/v CBS Sports					
4					Home Sports Entertainment			o/v ABC Sports	o/v Sports
5									o/v Sports
6					o/v Sports				o/v CBS Sports
7									
8									
9					Sports-vision			o/v WOLD Sports	
10						o/v CBS Sports		o/v ABC Sports	o/v Sports
11				o/v Sports	Home Sports Entertainment			o/v Sports	o/v Sports
12	o/v Sports							o/v ABC Sports	
13					New England Sports				
14					o/v Sports				
15						o/v Sports			
16									o/v Sports
17		o/v Sports				o/v CBS Sports	o/v Sports	o/v Sports	
18								o/v Sports	o/v Sports
19				o/v CBS Sports	Super-station WPIX	o/v Sports	o/v Sports	o/v Sports	o/v Sports
20	AFRTS o/v Sports				o/v Sports			o/v Sports	o/v ABC Sports
21					Super-station KTVT		o/v Sports		
22					o/v Sports				
23							o/v Sports	o/v WOLD Sports	
24								o/v Sports	

O/V = Occasional video on a non-scheduled basis

Horizontal polarization ▭ **Vertical polarization** ▭

	ANIK D1 104.5 W.	ANIK B1 109 W.	SPACENET S1 121 W.	WESTAR W5 123 W.	COMSTAR D4 127 W.	SATCOM F3 131 W.	GALAXY G1 134 W.	SATCOM F1 139 W.	AURORA F5 143 W.
1				o/v Horse Racing					
2	o/v Sports								
3				o/v Sports		Super-station WGN			
4						Sports Time			
5	o/v CBC Sports								
6									
7		o/v Sports		o/v Sports		ESPN			
8				o/v Sports-vue				NBC Sports	
9						USA Network	o/v ESPN Sports		
10									
11				o/v Sports					
12							Home Team Sports		
13	o/v CBC Sports	o/v CBC Sports							
14				PASS Sports					
15				o/v Sports			Super-station WOR-TV		
16				o/v Sports					
17									
18				o/v Sports			Super-station WTBS		
19									
20								AFRTS	
21		o/v CBC Sports		o/v Sports					
22				o/v Horse Racing		o/v Sports			
23		o/v Sports							
24									

	SATCOM F2 72 W.	GALAXY G2 74 W.	COMSTAR D1-2 76 W.	WESTAR W2 79 W.	SATCOM F4 83 W.	COMSTAR D3 87 W.	WESTAR W3 91 W.	TELSTAR 301 96 W.	WESTAR W4 99 W.
1						o/v News			
2								o/v CBS News	
3				o/v CBS News					
4								o/v ABC News L.A.	o/v News
5					o/v News		o/v CNN News		o/v News
6								o/v News	o/v CBS News
7									
8									
9								o/v WOLD News	
10						o/v CBS News		o/v ABC News N.Y.	o/v ABC News
11				o/v CBS News				o/v News	o/v News
12								o/v ABC News L.A.	
13									
14					o/v News				
15						o/v News			
16					o/v News				o/v CNN News
17						o/v CBS News	o/v News	o/v News	
18								o/v News	o/v ABC News
19				o/v CBS News	Super-station WPIX	o/v News	o/v News	o/v News	
20	AFRTS							o/v News	o/v ABC News
21					Super-station KTVT		o/v INN News		
22									
23							o/v News	o/v News	
24								o/v News	

O/V = Occasional video on a non-scheduled basis

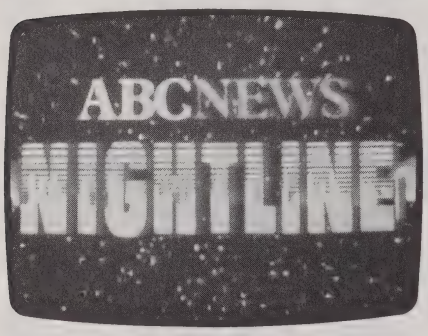
Horizontal polarization ▭ Vertical polarization ▭

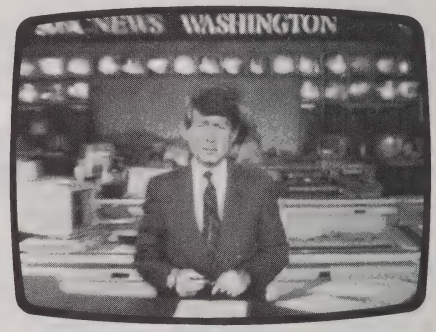
	ANIK D1 104.5 W.	ANIK B1 109 W.	SPACENET S1 121 W.	WESTAR W5 123 W.	COMSTAR D4 127 W.	SATCOM F3 131 W.	GALAXY G1 134 W.	SATCOM F1 139 W.	AURORA F5 143 W.
1									
2									
3				o/v News		Superstation WGN News			
4						Financial News Network			
5				o/v News Japan					
6						Superstation WTBS News			
7		o/v CBC News		o/v CBS News			CNN News		
8								o/v NBC News	
9									
10									
11				o/v News					
12								FNN	
13		o/v CBC News					C-SPAN		NASA
14						CNN News			
15				o/v News		CNN Headline News	Superstation WOR News		
16				o/v News					
17		o/v CBC News							
18				o/v News		Reuters News	Superstation WTBS News		
19						C-SPAN			
20								AFRTS	
21				o/v News		The Weather Channel			
22									
23		o/v CBC-FR News							
24	CBC News								

The Satellite News Adventure

More than ever before, news organizations worldwide are using satellites to link their studios with reporters in the field. With a satellite receiving system, you don't have to settle for the limited menu of news items served on the networks' evening news broadcasts. Even CNN Headline News, with its continuous coverage of major news stories, can only cover a fraction of the available news information.

A satellite TV system can give you direct access to unedited reports filed by globe-trotting camera crews from the world's major electronic news gathering organizations. Not only can you see the unedited news feeds of ABC, NBC, CBS and CNN, but also those of several other national and international news organizations, including INN (Independent Network News), Post-Newsweek, Gannett, Visnews, UPITN, CBC-Canada, and NHK-Tokyo. Satellite TV watchers can also pick up regional news reports linking local TV stations with their reporters in the field.





ABC News *Nightline* ©, with Ted Koppel.

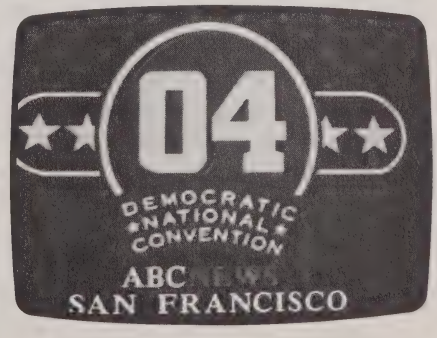
Many news-oriented programs now use satellites for remote interviews with guests who may be hundreds or thousands of miles away from the originating studio. A good example of this is the ABC late-evening news program, *Nightline*. On any given evening, *Nightline* provides a forum for the debate of the major issues of the day. On one particular evening, we observed N.Y. Yankee owner George Steinbrenner sitting in a local N.Y. City TV studio, awaiting his turn on *Nightline*. He was passing the time joking with the cameramen and getting the finishing touches put on his makeup job. One satellite TV channel was occupied by Steinbrenner; a second channel carried Ted Koppel; a third linked ABC N.Y. with their studios in London, which had a special report that would air during a later segment of the show. Each of these live feeds came into *Nightline's* main control room, where studio engineers edited them before distributing the program to ABC affiliates nationwide.

George Steinbrenner, in New York, speaks with Ted Koppel in Washington.

When a fast-breaking international news story draws reporters to the scene from all over the world, the participating news organizations will often share the same satellite uplink facilities. A single satellite channel—called a "pool"—will be used to distribute news reports directly from the "hot spot" of the day to the news studios of the participating networks. Recent satellite pool channels have been devoted to covering the war in Lebanon and the elections in El Salvador. A satellite pool is often created to help cover President Reagan when he is traveling. His recent trips to China and Europe—as well as appearances at home in the U.S.—have generated pool coverage. Anyone with a satellite TV dish can tune into the pool channel and watch one network reporter after another file reports from the scene.

You won't find many news feeds on the satellites dedicated to cable TV use. All their channels are tied up airing pre-scheduled programming. News seekers will have to aim their antennas toward one of several satellites whose spare capacity is activated on a non-scheduled basis. The preceding grid identifies those satellite TV channels which often carry news feeds of one kind or another. It can transform what could otherwise have been a hit-and-miss search into a news gold mine that will directly link you with international news information in a way that no other form of electronic communications can.

California Primary and broadcast of the 1984 Democratic Convention.



CNN news feed from Israel; German news feed from Los Angeles.

Some of these o/v (occasional-video) news channels will primarily serve a single customer, while others could be leased by any of the news networks at a moment's notice. By rapidly tuning through these satellite channels, you will be able to pick and choose from an excellent selection of the day's news reports. The best times to look for news feeds are in the early afternoon—just before the networks' evening news programs— and in the late evening, right before local TV stations air the final editions of their evening news.

If you want to see what it's like behind the scenes at one of the networks, try directing your dish at Westar W5 or one of the satellites which lie between Satcom F4 and Anik D1. CBS leases channels 10 and 17 on Comstar D3, channel 2 on Telstar 301, and channel 8 on Westar W5. ABC occupies channels 4, 10, and 12 on Telstar 301 and channel 20 on Westar W4. Telstar's channel 15 is a 24-hour-a-day link between ABC studios in the U.S. and ABC News London. Several times a day, news programs are transferred from London to the U.S. European program feeds destined for later use on *Good Morning America, World News Tonight, Nightline,* and *This Week* appear here along with a daily feed of news reports from the international news organization UPITN. At all other times the channel displays an identifying test pattern (see photo).

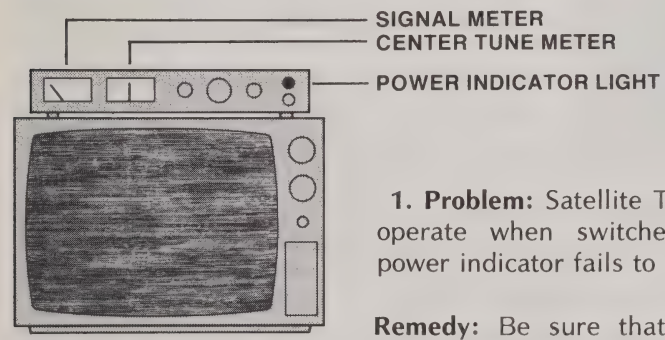
Channels 10 and 12 on Telstar 301 are used by ABC to send their regular nightly program lineup to affiliate stations around the U.S. At other times they can be occupied by news feeds or sports events. ABC also uses channel 20 on Westar W4 to link ABC studios in New York City with regional news desks in major cities throughout the country.

8 • Satellite TV Ailments and Remedies

Sooner or later, something will happen to your satellite TV system that you won't understand. There is a lot of technology wrapped up in one of these earth stations and this leaves room for something to go wrong occasionally. Before you start tearing out your hair or telephoning your local satellite TV dealer, look through the following simple checklist. In many cases, it will spare both you and your system installer needless aggravation.

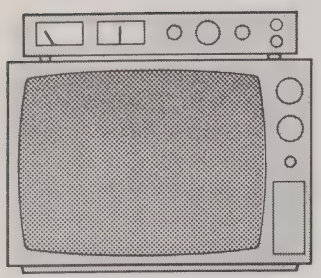
After you have had your system for a while and become more attuned to its idiosyncrasies, you will be able to solve many of the basic problems. The solutions are usually quite simple. If you are a beginner, remember that many difficulties can be cleared up just by understanding what all those knobs and dials do.

Video Problems



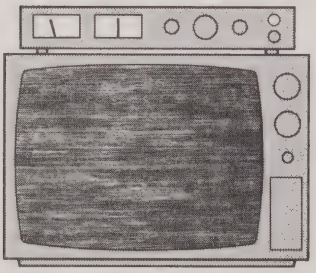
1. Problem: Satellite TV receiver fails to operate when switched on. Receiver's power indicator fails to light.

Remedy: Be sure that the satellite TV receiver is plugged into an AC wall outlet. If it is plugged into a socket, check the socket by plugging in a light or other appliance to make sure electricity is available from it. Check the receiver's fuse. If it is blown, check all the cables and wires that attach to the rear of the satellite receiver. They should be fastened firmly in place, with no crossed wires or shorted connections. After determining that the wiring is securely in place, replace the blown fuse with one that has the same voltage and amperage ratings. Using a fuse with a higher amperage rating could result in serious damage to your system. If the replacement fuse blows, check your outside wiring at the dish for faulty connections. If everything is securely and properly connected, you probably have a faulty component. Call your dealer and request a service call.



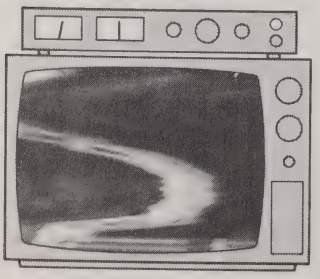
2. Problem: TV screen goes blank when satellite receiver is turned on. No sound or picture. The receiver's power-indicator light turns on but the signal-strength meter's needle doesn't move upward.

Remedy: Check to see if the coaxial cable that connects to the receiver's IF (intermediate frequency) input is loose. Make sure that wires which supply power to the downconverter are firmly attached to their connection points on the rear panel of the receiver. If the indoor connections look all right, check the LNA and downconverter connections at the dish. If defective cable connections aren't the problem, you could have a bad receiver or a faulty LNA. Some receivers have a fuse in addition to the main fuse for the receiver; this second fuse protects the LNA and downconverter in the event of a short circuit. Check this fuse. If it's blown, replace it with one that has identical voltage and amperage ratings. If none of this solves the problem, it's time to call your dealer.



3. Problem: No picture can be received from any of the channels and the audio is only a hiss. The receiver's signal-strength needle moves upwards.

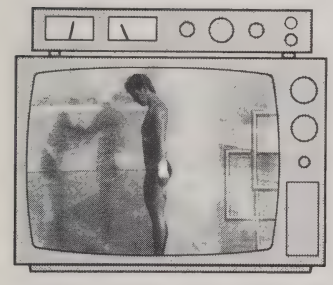
Remedy: Change the polarity format of the receiver and tune through the channels again. If you still aren't receiving, put the receiver into the scan mode and move the dish around to see if any signals pop into view. If you still get nothing, check your the dish to see if any of the mounting bolts have loosened and thrown the dish out of alignment. Put your hand on the rim of the dish and shake it. If it flops around loosely, the dish is probably misaligned. Try tightening any loose bolts and moving the dish again while scanning for a picture. If there is no signal, then it's time to call the dealer for help.



4. Problem: The picture looks wavy and distorted. Other indicators look normal.

Remedy: Try some of the other channels. It could be that you are receiving a scrambled TV signal. If all of the channels look this way, check the receiver's video-inversion switch. It may have been accidently

switched to the "invert" position. If the problem continues, try adjusting the receiver's fine tune control. If that doesn't help, you probably have a faulty receiver. Have it brought into the shop for bench testing and repair.



5. Problem: The picture looks like the outline of a second channel coming in on top of the one you are watching.

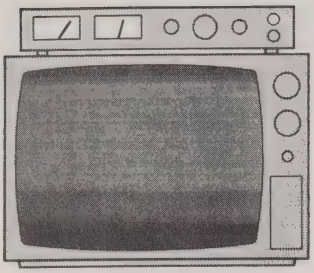
Remedy: Try adjusting the receiver's skew control or polarity control until the interfering signal disappears. If adjusting these controls doesn't make any difference check the polarizer cable connections to the receiver or hand-held polarizer control to be sure they are making proper contact. If you still get no response, check the polarizer connections out at the dish's feedhorn to make sure there is firm contact.

6. Problem: There is a faint image—or ghost—of a second TV picture being received along with your selected TV channel.

Remedy: Nearby broadcast TV stations are transmitting so strong a signal that it is entering your system along with the desired program. Check the coaxial cable that connects the satellite TV receiver or RF modulator to the antenna input leads of your TV. If you are connecting your receiver to several TV sets throughout the home, make sure that all cable connections within the system are tightly screwed into place. Some installations will use a simple "A/B" switch that attaches to the antenna terminals of the TV set, so you can switch the TV either to the satellite TV system or the local TV stations. The ghost effect will occur when this switch has not been fully moved to either the "A" or "B" positions, or when the connection from the satellite TV receiver is loose.

7. Problem: A weird pattern appears on top of the selected satellite TV channel. Adjustment of the polarity and skew controls have no effect on the interfering pattern.

Remedy: Do you have a personal computer at home? Computers generate a whole spectrum of radio signals that sometimes interfere with your home satellite TV system. If this is happening to you, try moving the computer and satellite receiver further apart. A distance of three feet or more should do the trick.

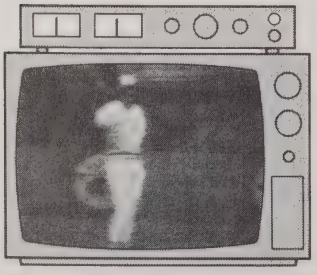


8. Problem: Some of the satellite TV channels have varying amounts of noise or sparklies which streak through the picture; getting good reception on some of the channels is difficult or even impossible. This problem only seems to affect a few of the satellites at specific times of the day. At other times, reception is perfect.

Remedy: This problem is probably caused by microwave interference from one of Ma Bell's telephone relay stations. In many cases, putting microwave filters between the downconverter and receiver can reduce or eliminate the interfering signals entirely. If interference persists, you may have to move the dish to another part of the yard, or install special microwave shields or "traps" to block out the interfering signals. Your dealer should have the technical know-how to deal with this problem.

9. Problem: The receiver can only pick up half of the available channels of each satellite.

Remedy: Check to see that the polarity format switch is in the correct position. You can look inside the opening of the feedhorn and see if the little wire probe turns when someone adjusts the polarity control; if it doesn't turn, then the problem could be a loose polarity power wire. If the outside temperature is below freezing, moisture that condenses inside the feedhorn could turn to ice, immobilizing the little probe. If this happens, use a lightbulb or other heat source to defrost the polarizer. (If your system has an electronic polarizer, there are no moving parts to freeze, so this remedy won't help you.) Check the indoor and outdoor connections to the polarizer. If these are securely fastened, the problem could be a faulty polarizer or polarizer power supply.



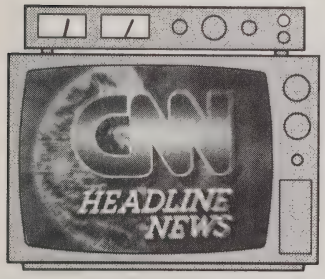
10. Problem: Satellite TV channels are weaker than usual.

Remedy: Check the antenna mount for loose bolts. Have you had a particularly strong wind or rain storm lately? A slight shift in the alignment of the dish can result in weaker reception than usual. Check the support struts holding the feedhorn in place for loose bolts as well. Does the feedhorn still point toward the center of

the dish? If it is out of kilter, this can affect the performance of the system. Have birds or wasps built nests inside the opening of your feedhorn? This happens quite often and can severely impair reception. Check the cable that connects your TV to the satellite receiver to see that it's tightly screwed into place.

11. Problem: Reception of certain satellite TV channels just doesn't seem to be as crisp or as clear as it has been in the past. Impulse noise—or sparklies—shows up on channels that have never had this problem.

Remedy: Check the antenna mount to make sure that none of the bolts have loosened, which would have thrown the dish out of alignment. You may need to have your system installer come back and readjust the alignment of the mount so the antenna tracks properly. Have you been adjusting the skew or polarity controls lately to get the highest possible signal level? If you have had your system for a long time, say, a couple of years or so, the recent appearance of noise on some channels may be the result of the satellite ageing. As the years go by, the power level put out by the satellites decreases slightly. To correct for this, you may have to use a threshold extension filter or trade your LNA in for one that has a lower noise temperature.

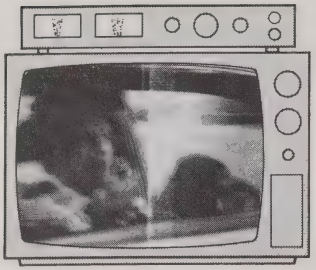


12. Problem: When the receiver is on a particular channel for any appreciable length of time, the picture seems to drift out of tune, requiring frequent adjustments to the fine-tune control. This seems to happen most often right around sundown, or when the outside temperature drops to lower levels.

Remedy: Rapid changes in outdoor temperature can affect the stability of some satellite TV receivers. Make sure that the receiver's AFC switch is turned on. This will help reduce the receiver's drift at these times. In some cases you will have to insulate the outdoor enclosure which houses the downconverter to help stabilize its temperature.

13. Problem: At irregular intervals, both the picture and the sound will go from crystal-clear to extremely weak. This happens when receiving all satellites and channels. This problem seems to coincide with heavy wind or rain storms.

Remedy: Check the antenna mount for loose bolts. Strong winds or rain could be moving the antenna out of position.



14. Problem: Satellite TV channels are received, but both the picture and the sound break up intermittently. The signal meter also jumps around sporadically. Bands of noise tear through the picture at irregular intervals.

Remedy: You could have water in the cable connectors which attach to the LNA and downconverter. Even if these connections appear to be tight, water can seep into the smallest of cracks and adversely affect the performance of your system. All connections should be dried out thoroughly (try using a small hair dryer) and completely covered with a waterproofing substance like coax-seal which is available from your local electronics dealer. This should prevent moisture from creeping back into the connections after the next rainstorm.

Audio Problems

15 Problem: Video reception is fine, but there is no audio signal.

Remedy: Check to make sure the audio tuning is properly set. If your system has a stereo processor, be sure that the cable that connects it to the satellite receiver fits snugly. If you're using a home sound system to amplify the audio, check the connecting cables. If you have an external modulator or monitor, check the audio cable. Some satellite receivers have an audio volume control; make sure that it's up all the way.

16. Problem: The sound from MTV or some of the other services sounds tinny. Your favorite tunes sound as if some of the instruments are missing.

Remedy: You may have tuned your receiver to the wrong audio tuning position. Matrix stereo transmissions use two separate signals. One signal is made up of the left stereo channel plus the right stereo channel, while the other is composed of the left stereo channel minus the right. When these two signals are mixed together inside a stereo processor, separate left and right audio channels are produced. If you have inadvertently tuned to the audio signal that is the left minus the right stereo channel, it will sound like an incomplete audio signal. Readjust your audio tuning control until you find the best-sounding signal.

17. Problem: Some of the satellite TV audio channels sound noisy.

Remedy: Try adjusting the audio tuning control slightly. If the problem persists, try switching the narrow band audio control to the "on" position. If your receiver has noise reduction circuitry, try switching that on.

Control Problems

18. Problem: The satellite receiver's remote control doesn't work.

Remedy: If the remote control has a cable that plugs into the back of the receiver, make sure it is tightly connected. Some receivers have a switch that must be on for the remote control to function; be sure that this switch has been turned on. With wireless remote control, be sure no obstructions block the line of sight between the hand-held control and the little sensing window on the front of the receiver. You can also check the batteries that power the remote control. They may need replacing.

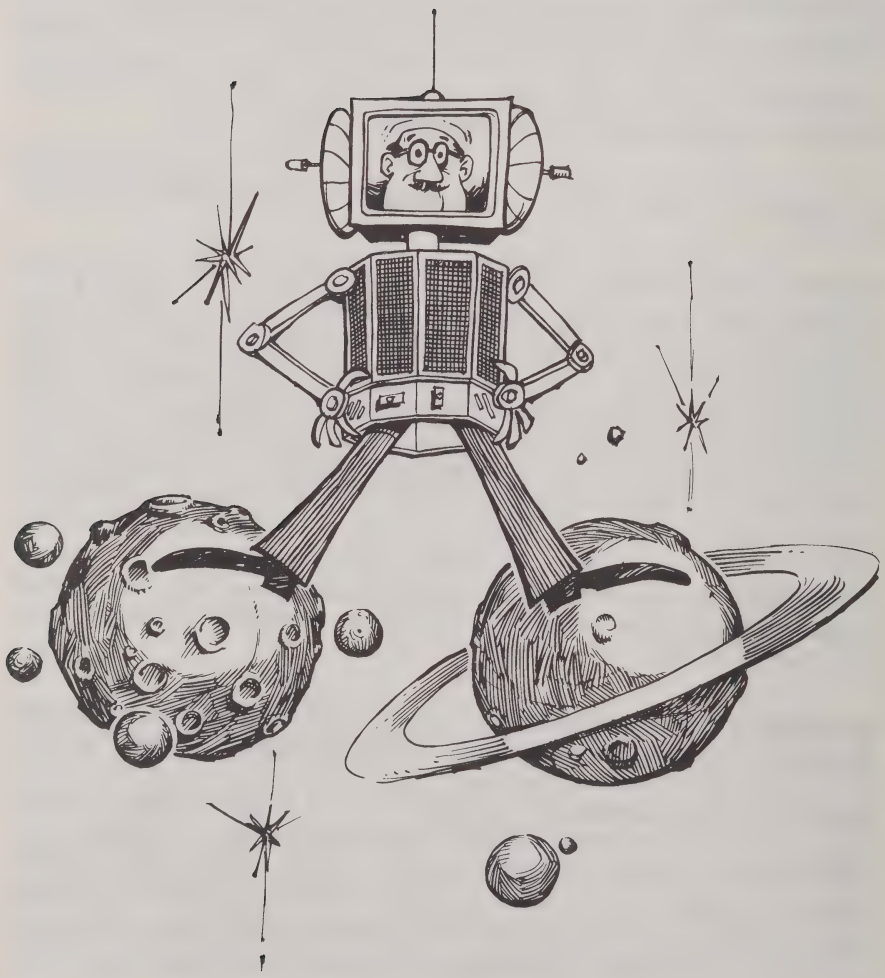
19. Problem: The dish does not move when you press the antenna's motor controls.

Remedy: Check the cables that run between the controller and the motor for loose connections. Take a look at the fuse for the dish control console. If it is blown, go out to the dish and see if something is obstructing its free movement. Replace the blown fuse with one that has the same amperage rating. When the outdoor temperatures are below freezing, any water that has seeped into the gearbox can freeze and immobilize the motor. You can check for this by taking the cover off the gearbox. If you find ice inside, thaw it out and drill a small hole in the bottom of the gearbox so the water can drain out. Reseal the opening around the gearbox cover with silicon rubber sealer. Applying an occasional coat of grease to the motor's mechanical arm can also help to keep it from seizing up. This should always be done before leaving the antenna in a stationary position for a long period of time.

20. Problem: The antenna motor's computerized controller keeps losing its memory, which requires that it be reprogrammed frequently.

Remedy: Make sure that the controller's AC is snugly plugged into the wall socket. The controller's power cord should not be plugged into a socket that is controlled by a light switch: If the control console loses its electrical power source for a long period of time, the memory's battery supply will be drained and the controller's memory will be lost. Be sure to keep this unit plugged into an active AC outlet at all times.

Part Four:
New Worlds to Conquer



9 • Exploring the Higher Frequencies

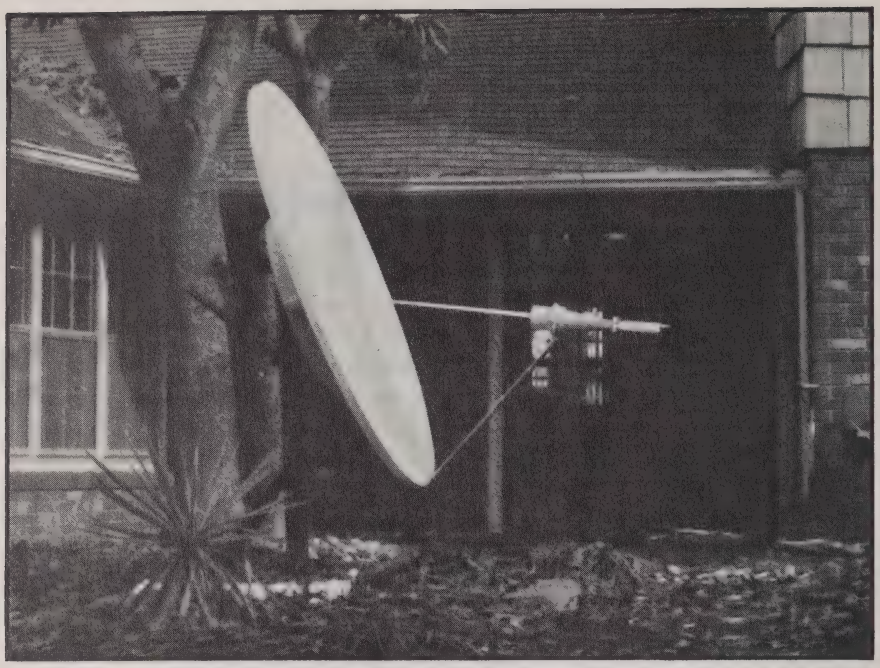
All the satellites we have covered so far operate within just one of several bands of frequencies that have been set aside for satellite communications. The range of frequencies used by our Satcom, Galaxy, Westar and Comstar birds is often referred to as the "C" band. Several new satellites operating within a higher frequency band—called the "Ku" band—have recently gone into orbit, significantly expanding the number of satellite channels available for use within North America.

The evolution of satellite communications closely parallels the expansion of terrestrial television in the 1960s. When VHF TV channels 2 through 13 began filling up in many major metropolitan areas, the FCC decided to open up a whole new group of TV channels operating on ultra-high frequencies (UHF). It took some time before UHF TV caught on, but today every major American city has several UHF TV stations in operation and every American-manufactured TV set can tune into UHF channels 14 through 69 as well as VHF channels 2 through 13.

Today's satellite systems can only receive C-band signals. However, the earth station of the not-too-distant future will have a single antenna and receiver that can tune into both Ku- and C-band channels—as soon as there are enough active channels on Ku-band birds to make the additional investment worthwhile.

Advantages of Ku-Band Satellite TV

Additional channel capacity isn't the only attraction offered by these new Ku-band satellites. Ku-band frequencies offer several advantages for relaying satellite TV programs. While C-band satellites share the same frequencies as those used by the phone company's ground-based microwave links, Ku-band satellites have exclusive rights to the frequencies that they occupy. As a result, installers or operators of Ku-band satellite receiving systems are not plagued with microwave interference problems. Since the Ku-band satellite operators don't have to worry about interfering with Ma Bell, they can also transmit more-powerful signals than their C-band counterparts. This makes it possible for smaller-sized antennas to be used to receive their more potent signals. By using smaller antennas, Ku-band DBS operators can not only appeal to people who dislike the appearance of giant C-band antennas, but also get around restrictive zoning ordinances that have been adopted by zoning boards in several metropolitan areas.



A Ku-band dish.

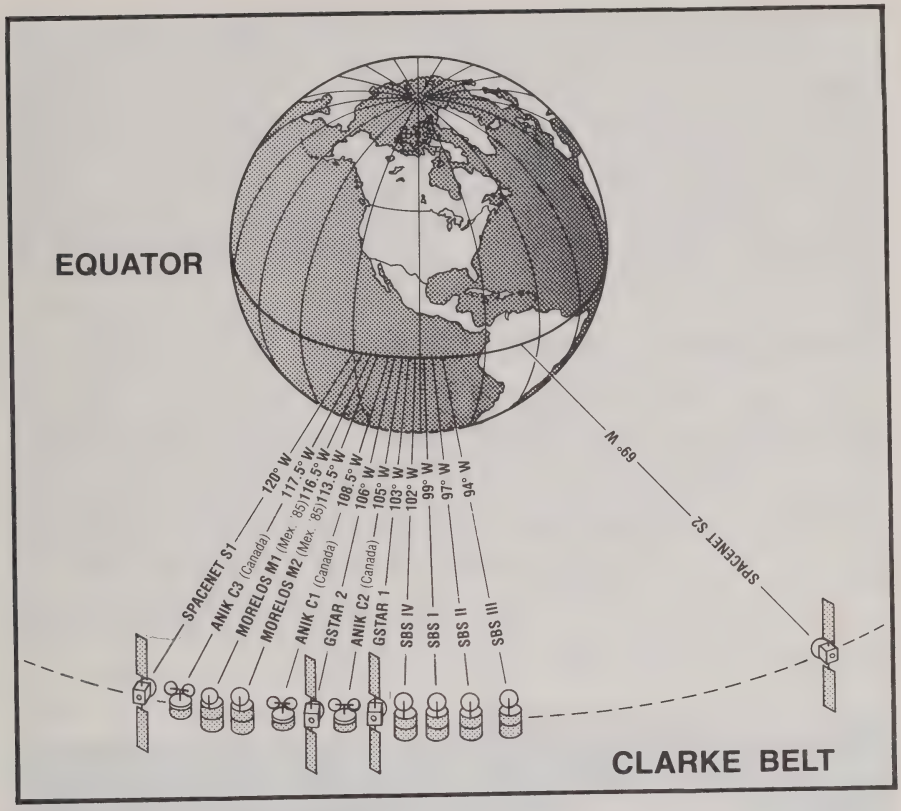
Operational Ku-Band Satellites

While there are now several Ku-band satellites in operation, their main function for the moment is transmitting telephone and business communications rather than satellite TV. The business community primarily uses SBS (Satellite Business Systems) satellites extensively for the relay of computer data and voice communications between the offices of major corporations. However, one of the four SBS satellites now in orbit supplies channels for use by one of the broadcast TV networks. NBC is in the process of installing Ku-band earth stations at each of their affiliates around the U.S. Using several channels onboard the SBS III satellite, NBC is able to offer its regular line-up of TV programs as well as regional coverage of major league sporting events.

Ku-band channels are also active on the Spacenet satellites. Spacenet I—a dual-band bird that transmits channels on both C- and Ku-band frequencies—has most of its Ku-band capacity reserved for relaying long distance telephone communications.

The ANIK C Satellites

The first of Canada's ANIK C satellites was launched from the space shuttle Columbia in 1982. Today ANIK C3 is used to relay educational and subscription program services to low-power TV stations and cable TV



North American Ku-band satellites.

operators throughout Canada. ANIK C satellites have four primary spot beams, each covering one-quarter of Canada. For most broadcasts, two spot beams are combined, providing services to either the eastern or western portion of the country. Anik C satellites carry 16 wider-than-usual channels, each of which can accommodate two TV signals.

ANIK C3 Program Guide

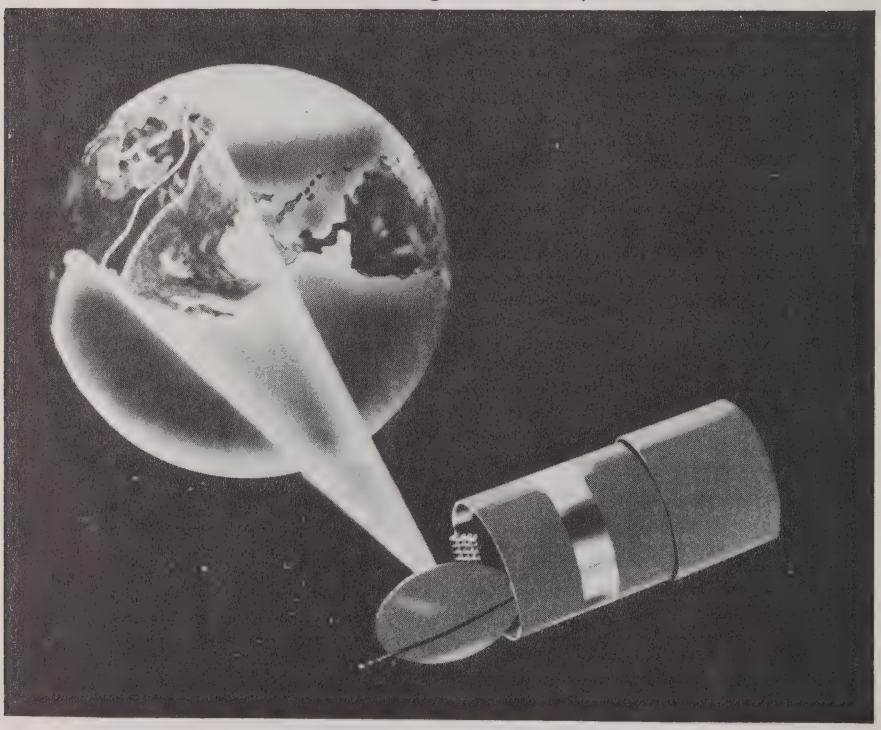
ANIK C3 transmits several entertainment TV services as well as educational networks. "The Knowledge Network," an educational TV service produced by the government of British Columbia, provides instructional courses for people in the rural parts of the province. This service can be picked up only from locations in the westernmost provinces of Canada or from the northwestern section of the U.S. "Premiere Choix" offers a pay-TV entertainment service that has both English and French language channels. "Super Channel Alberta" is a 24-hour-a-day entertainment service featuring movies and sports. Broadcasting in stereo, Super Channel Alberta's service on Anik C3 can be seen throughout the western half of Canada and the northwestern U.S.

Several premium entertainment services are available in the eastern half of Canada, including "Premiere Choix," "The Atlantic Satellite Network," Montreal's French-language "TVEC," and "Super Channel Ontario." An educational TV network called "TV Ontario" also transmits a signal into eastern Canada that is intended for retransmission via low power TV stations within the province. Starting January 1st, 1985, Radio Quebec will begin distributing its French-language TV service via Anik C3 to customers throughout Quebec. None of the Canadian cable TV programming is scrambled at this time.

Canada's ANIK C2 Satellite

In 1982, American-based USCI (United Satellite Communications Incorporated) leased five channels onboard Canada's Anik C2 satellite in order to initiate the world's first direct-to-home satellite TV service. USCI arranged for the Canadians to redirect Anik C2's transmitting antenna so that the footprint of the satellite would cover the northeastern portion of the U.S. Five entertainment channels comprise USCI's program service: "USCI Showcase," an entertainment channel featuring first-run movies as well as music and variety specials; "Movie-Time," USCI's 24-hour-a-day movie service; a video music channel with contemporary, pop, country

Telesat Canada's Anik C satellite showing combined "spot beams."



and soul music videos; the Entertainment and Sports Network (ESPN), a popular cable sports network owned by ABC; and USCI's "TV-Time," a feature film and entertainment channel. Radio Shack has been marketing USCI's Ku-band earth stations to consumers in the northeast and the RCA Service Company has been contracted to install systems at thousands of homes in the northeast. Subscribers must purchase the satellite receiving equipment at a cost of either $395 or $495, depending on whether a three- or four-foot antenna is used, and pay a $24.95 monthly subscription fee.

Such an ambitious business venture involves enormous start-up costs, so USCI will not begin to turn a profit until the end of 1986, at which time the company estimates that it will have more than one million subscribers nationwide. In order to obtain the necessary investment dollars to keep its DBS dreams alive, USCI recently announced its intension to form a partnership with STC (Satellite Television Corporation), a company that was previously USCI's main competitor. By pooling resources, USCI and STC hope to create a DBS (Direct Broadcast Satellite) service that can successfully compete with other more-established forms of electronic entertainment.

DBS: Satellite TV of the Future

Whether or not its joint venture with STC ever achieves success, USCI's direct-to-home satellite TV service marks the beginning of a whole new era in television broadcasting. While the idea of using geostationary satellites to directly broadcast TV programming to the home has been around since 1945, it wasn't until 1980 that the first concrete proposal for actually creating a DBS service was made. In 1980, COMSAT—the American representative of INTELSAT—filed a petition with the FCC asking for permission to operate a DBS service within the U.S. Other companies, sensing the opportunity, soon jumped on the DBS bandwagon by filing proposals of their own.

Initially the term DBS referred exclusively to high-powered satellites in the upper end of the Ku-band frequencies that have been set aside for satellite communications by the World Administrative Radio Conference (WARC). The DBS applicants had to wait for FCC permission to construct their new high-powered DBS satellites. Meanwhile, entrepreneuring corporations like USCI realized that lower-powered Ku-band satellites, already operating on channels adjacent to those allocated by WARC for DBS, could be used as a temporary site for DBS services until true-DBS birds could get off the ground in the latter part of the decade. While these lower channels were at first assigned for non-broadcast purposes, the FCC decided in 1982 that direct-to-home satellite TV services could use them as well, so that rural Americans could obtain immediate benefit from the existing technology.

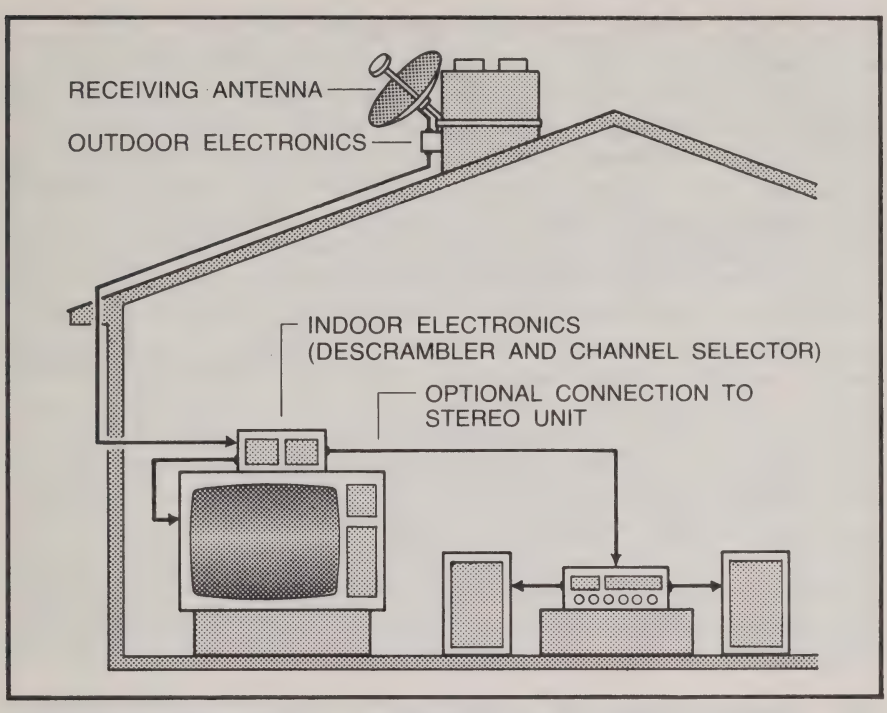
At the same time that USCI was beginning DBS service, several cable TV services, including Home Box Office and Turner Broadcasting, began

investigating the use of our present C-band satellites as an alternative means of delivering premium TV services directly to the American public. In fact, a C-band DBS effort by HBO and others could eventually be launched via Galaxy I. With an established network of more than 750,000 earth stations, private C-band home systems make up a large and growing market. Several companies are already selling C-band satellite TV services to dish owners, including adult-entertainment services like Fantasy and the Pleasure Channel and CANCOM-DBS, which leases decoders for the seven North American superstations that are transmitted by the ANIK D1 satellite.

Although the term DBS originally referred only to TV services transmitted by the Ku-band satellites, it now means any satellite TV service intended for direct reception by private individuals.

Making the Small Dish Work

While C-band systems have proven effective as delivery systems, both the large size of the antennas and their high cost do limit the market. Satellite TV will only become a part of everyone's lifestyle when satellite



Ku-band home DBS system.

technology allows the use of inexpensive small-diameter dishes on rooftops everywhere.

To make the small dish work, DBS satellites must be able to transmit high-powered signals of 100 watts or more. This is more than ten times the amount of power now transmitted by any of the cable-TV satellites. If C-band satellites were to transmit that high a power level, telephone links throughout the United States would be hopelessly garbled. Some DBS companies are planning on having 200 watt transmitters for each TV channel on board their satellites.

Getting reliable power tubes in the 100 to 200 watt category has proven to be a bit of a problem. The Japanese were very unhappy with the abrupt failure of two out of three of the high-powered transmitters carried by their Yuri DBS satellite, launched in early 1984. Instead of demonstrating how well DBS could supply rural areas with television, this failure has convinced companies like CBS, Western Union and RCA that the reality of DBS is still a long way off.

The Long-Term Chances for DBS

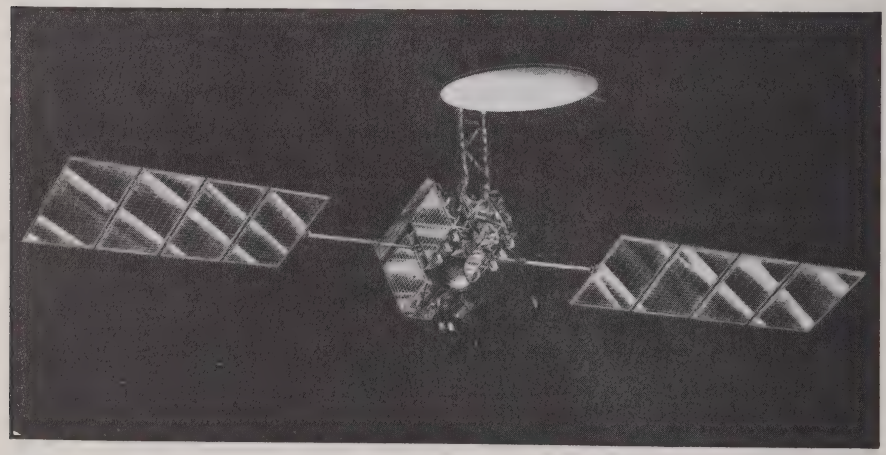
Even with all the risks involved, Ku-band DBS satellites remain a tantalizing financial opportunity for corporations that can develop a DBS delivery system. Today, 20 million households in the United States have no

access to cable TV. A recent survey showed that more than half of all people now receiving cable TV services would also be willing to purchase a DBS earth station if the cost of the equipment was less than $300. The estimated cost of creating a 6-channel DBS service is about $500 million. While that is a lot of money, keep in mind that a single TV station—KTLA Los Angeles—recently sold for more than $250 million. While KTLA only has a potential viewing audience of a few million, a bona-fide DBS service could serve nearly every household in North America. For this reason, we expect that DBS will eventually become a major force in communications broadcasting. Given the cautious attitude most major investors have toward DBS, true high-powered DBS satellite TV services will probably not become available until the latter half of the decade. We expect the first direct-to-home subscription TV services to get their start on either C-band or on one or more of the upcoming low-powered Ku-band satellites. A slower approach toward the establishment of high-powered DBS services would allow Ku-band satellite technology to develop improved performance and reliability. Several American corporations, including STC (Satellite Television Corporation), DBSC (Direct Broadcast Satellite Corporation), USSB (United States Satellite Broadcasting), and Dominion Satellite have continued to pursue DBS as a long-term investment that could one day provide a phenomenal payback.

STC—Satellite Television Corporation

STC is a subsidiary of COMSAT established in 1980 to further the development of DBS in North America. STC has leased five channels from the SBS IV satellite and plans to use them to deliver the joint STC/USCI interim-DBS service to northeastern U.S. households starting in 1985. SBS IV will be used by STC/USCI until high-powered DBS satellites become available later in the decade.

High powered DBS satellite.



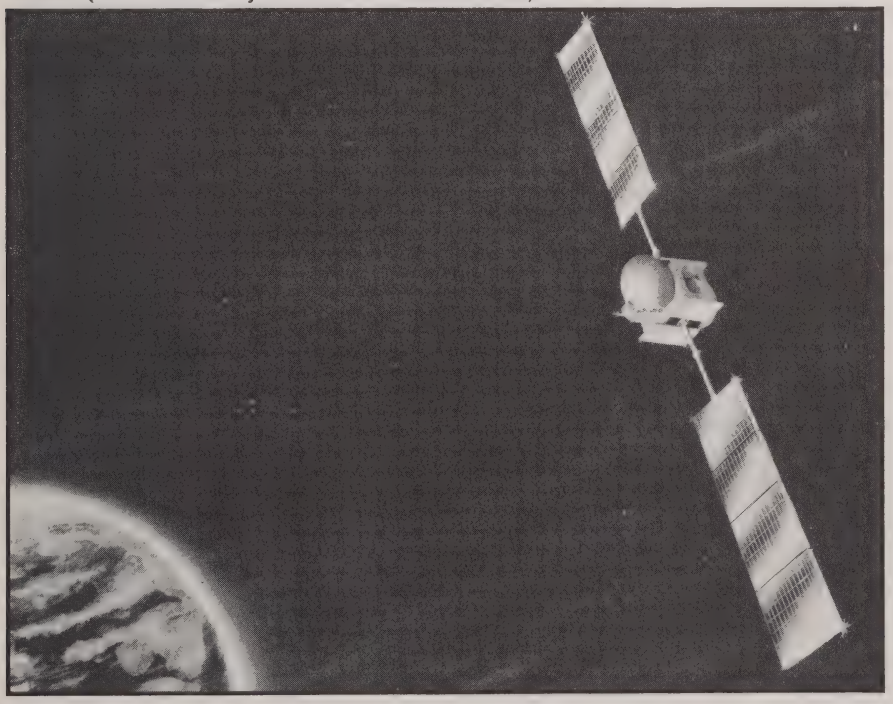
In 1983, STC was granted permission by the FCC to begin construction of their high-powered Ku-band DBS satellites. RCA Americom is now manufacturing these satellites and plans to have them ready to fly by 1986. Both STC satellites will be located at 110 degrees west longitude; from this location the satellites will be able to beam six high-powered DBS TV channels to subscribers nationwide.

STC estimates that its whole home system – which includes a two and-a-half-to-three-foot dish, LNC, receiver, and individually-addressable descrambler — will cost subscribers between $350 and $400 initially, with a monthly subscription fee of about $15 — $20 per month.

Other DBS Corporations

Several more companies intend to introduce high-powered DBS services between 1987 and the end of the decade. USSB (The United States Satellite Broadcasting Company) plans to have two DBS satellites, each with eight channels. USSB birds will be located at 110 and 148 degrees west longitude. USSB plans three kinds of operations: a bona-fide DBS service that beams signals into individual households; a broadcasting network that exchanges news, sports and entertainment programs with member affiliates; and a supplier of programs to low-powered independent

Ku-band satellite will be used for transmission of voice, data and images to all 50 states. (Photo courtesy of RCA Astro-Electronics)



stations around the country. Since the USSB DBS services will be supported by commercial advertising, there are no plans at this time for scrambling the signals to prevent unauthorized reception.

In 1987, DBSC (Direct Broadcast Satellite Corporation) hopes to launch two DBS satellites to be located at 101 and 148 degrees west longitude respectively. DBSC plans to lease or sell channels to outside programmers, rather than initiate programs of its own. The footprint from each DBSC satellite will cover either the eastern or western portion of the continental U.S. Each satellite will also have steerable spot beams that can be aimed at smaller areas of the country.

The FCC recently gave Dominion Video Satellite Systems, Inc., the go-ahead to construct two DBS satellites. The first Dominion bird will be launched in 1987 (at 119 degrees west longitude). The satellite will beam 6 channels of religious, educational, and family entertainment programming throughout North America. Dominion plans to expand its service by adding a second satellite sometime in 1989.

At one time or another, several other corporations have announced their intentions to get into the DBS business. However, none of these companies have taken the steps necessary to launch services before the end of the decade.

We would like to thank all of the production companies, networks, equipment manufacturers and individuals who have contributed photographs or information. Uniden equipment is featured on pages 50, 52, 56, 57, 59, 60, 64, 65, 67, 68, 69 and 70.

Additional photo credits:

Paraclipse	page:	51	R.L. Drake Co.	78
ADM		53	Microwave Filter Co.	81
RAYDX		55	Sansui	82
Chaparral		62	Luly Telecommunications	82
Arunta		72	Locator, Inc.	83
Sony		74	M/A Com	114
JVC		75	USCI	116
Sanyo		76	STC	120
Panasonic		76	RCA	121

Appendix

A Glossary of Satellite Terms

Actuator: a kind of motorized mechanical arm that is used to change the direction of the satellite TV receiving antenna.

AFC: (See Automatic frequency control.)

Audio subcarrier: A separate frequency offset from the satellite channel's main carrier that is used to transmit the sound portion of a TV program. Subcarriers are also used to transmit radio station signals.

Automatic frequency control [AFC]: This electronic circuit is similar to AFC circuits used in FM radios to keep the receiver locked onto the selected channel. Whenever the circuit senses that the receiver is drifting out of tune, the AFC automatically readjusts the receiver back to the channel's center frequency.

Azimuth: one of two coordinates used to align a dish onto a satellite. The azimuth is expressed in degrees and can be determined from compass bearings that have been corrected to true north.

Antenna: a metal object that is used to capture signals sent by radio or TV transmitters.

Band: a group of adjacent frequencies that can contain a number of separate radio and/or TV signals.

Baseband: the combined video and audio signals prior to processing. Baseband signals are often used to drive stereo processors and descramblers.

Bird: a man-made satellite.

Carrier: the center frequency of any satellite TV signal.

Channel: a group of adjacent frequencies that have been specifically assigned for the reception or transmission of a single radio or TV signal.

C band: A range of frequencies between 3.7 and 4.2 GigaHertz that has been assigned to satellites for communications purposes.

Clarke belt: a circular orbit used by communications satellites that is located 22,300 miles above the equator.

Coax, coaxial cable: a type of shielded wire cable that is used for connecting communications components together.

Color bar signal: a test pattern composed of bars of color that is used by video engineers for checking particular functions of color video systems. It is an industry standard reference.

CONUS: abbreviation for Continental United States.

dB: (see decibel.)

DBS: abbreviation for Direct Broadcasting by Satellite

Decibel [dB]: a unit of measurement that expresses the relationship between two signals.

Declination: one of the basic adustments that is built into any polar mount antenna. The required declination angle will vary depending upon the latitude of the site location.

Direct broadcast satellites [DBS]: satellites operating in the 12.2 to 12.7 GHz frequency band that has been set aside for use by services which intend to directly supply the consumer with satellite TV programming.

Dish: a satellite receiving antenna.

Domsat: a domestic communications satellite.

Elevation: one of two coordinates used in the alignment of a dish onto a satellite, it is the tilt angle of dish relative to the horizon.

F connector: a type of coaxial cable connector used in cable and satellite TV systems.

Focal point: as the satellite TV signals reflect off the surface of the dish, they are focused onto a common point—called the focal point—that is located to the front and center of the antenna.

GigaHertz [GHz]: a frequency of one billion cycles per second.

Hertz: a measurement of frequency in cycles per second, named after the German scientist Heinrich Hertz who first became aware of the properties of radio waves.

Hum bars: interfering horizontal bars which pass slowly though a picture.

Inclinometer: a measuring device that can be used to determine the elevation angle of the antenna.

Isotropic antenna: an imaginary antenna conceived by engineers that is used for gain measurement purposes.

K or Ku band: a range of frequencies between 11.7 and 12.7 GigaHertz that has been set aside for use by communications satellites.

KiloHertz [KHz]: a frequency of one thousand cycles per second.

Look angle: the angle at which the antenna looks up at the satellite, also called the elevation angle.

MegaHertz [MHz]: a frequency of one million cycles per second.

Microprocessor: a mini-computer circuit on an IC chip that has its own memory and associated circuits.

Microwaves: super high frequencies used for communications purposes by Ma Bell's terrestrial telephone relay stations as well as communications satellites.

Microwave interference: interference caused to satellite receiving systems by terrestrial users of microwave frequencies.

Modulation: the process of encoding video and audio information onto a carrier frequency.

N connector: a special microwave connector used in conjunction with LNA and downconverter cables.

Parabolic antenna: an antenna with a surface that conforms to the shape of a parabola.

Prime focus: the type of antenna feed where the feedhorn and NA are positioned to the front and center of the dish.

Signal splitter: a cable TV accessory that divides a cable signal into two or more equal portions.

Snow: video noise.

Sparkles [or sparklies]: impulse noise that streaks through video coming from any of the weaker satellite TV channels.

Subcarrier: (see Audio subcarrier.)

Television receive only [TVRO]: satellite TV receiving system.

Terrestrial interference [TI]: locally-based microwave signals which interfere with satellite TV reception.

Transponder: satellite TV channel.

TVRO: (see Television receive only.)

Satellite TV Program Guides

There are several magazines that are entirely devoted to supplying an hour-by-hour guide to most of the satellite TV channels. Any of these publications can keep you abreast of developments in the fast-changing world of satellite TV. For further information contact:

Monthly Publications

Satellite Orbit Magazine
P.O. Box 1700
Hailey, Idaho 83333
(1-800-321-2100)

Bi-Monthly Publications

Satellite Dish Magazine
P.O. Box 8
460 Tennessee St.
Memphis, Tennessee 38101
(1-901-521-1580)

Weekly Publications

Satellite TV Week
P.O. Box 308
Fortuna, California 95540
(1-800-358-9997)

Channel Guide
Box 2027
Englewood, CO 80150
(1-800-654-3006)

Satellite TV Preview
P.O. Box 31225
Billings, Montana 59107
(1-406-259-9067)

Scrambled Satellite TV Services

The following scrambled satellite TV services are available to any home earth station owner who wishes to pay a monthly subscription fee and annual descrambler lease fee. For further information, contact:

CANCOM DBS
Department 1309
45 Charles Street East
Toronto, Ontario M4Y 1S2
(1-800-387-1309)

The Fantasy Unrestricted Network
2902 Almaden Expressway
San Jose, California 95125
(1-408-559-8812)

Satellite Channel Chart

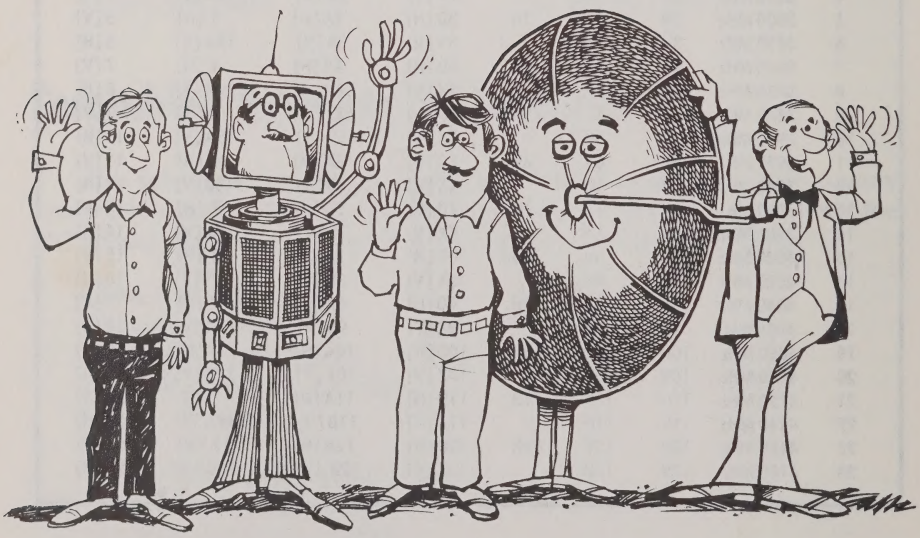
The operating engineers for North America's satellite systems have their own special designations for each of the available 12 or 24 channels carried by satellites within their fleet. For example, Westar V operators often refer to channel 5 as transponder 3D, and so on. Oftentimes these designations will be displayed as part of a test pattern carried by some of the satellite channels; at other times, the channel is merely identified by its frequency in MegaHertz (MHz). The following Satellite Channel Chart will help you correctly interpret the various designations now in use. When the letters H and V are used they indicate whether the channel is vertically or horizontally polarized on the particular satellite in question.

SATELLITE CHANNEL CHART

CHANNEL NO.	FREQUENCY IN MHz	GALAXY SATS	COMSTAR TELSTAR SATS	WESTAR II, III ANIK B	WESTAR IV, V SATS	ANIK D SATS	SPACENET SATS	SATCOM SATS
1	3720 MHz	1H	1V	1H	1D [H]	1A [H]	1 [H]	1 [V]
2	3740 MHz	1V	1H		1X [V]	1B [V]	13A [V]	2 [H]
3	3760 MHz	2H	2V	2H	2D [H]	2A [H]	2 [H]	3 [V]
4	3780 MHz	2V	2H		2X [V]	2B [V]	13B [V]	4 [H]
5	3800 MHz	3H	3V	3H	3D [H]	3A [H]	3 [H]	5 [V]
6	3820 MHz	3V	3H		3X [V]	3B [V]	14A [V]	6 [H]
7	3840 MHz	4H	4V	4H	4D [H]	4A [H]	4 [H]	7 [V]
8	3860 MHz	4V	4H		4X [V]	4B [V]	14B [V]	8 [H]
9	3880 MHz	5H	5V	5H	5D [H]	5A [H]	5 [H]	9 [V]
10	3900 MHz	5V	5H		5X [V]	5B [V]	15A [V]	10 [H]
11	3920 MHz	6H	6V	6H	6D [H]	6A [H]	6 [H]	11 [V]
12	3940 MHz	6V	6H		6X [V]	6B [V]	15B [V]	12 [H]
13	3960 MHz	7H	7V	7H	7D [H]	7A [H]	7 [H]	13 [V]
14	3980 MHz	7V	7H		7X [V]	7B [V]	16A [V]	14 [H]
15	4000 MHz	8H	8V	8H	8D [H]	8A [H]	8 [H]	15 [V]
16	4020 MHz	8V	8H		8X [V]	8B [V]	16B [V]	16 [H]
17	4040 MHz	9H	9V	9H	9D [H]	9A [H]	9 [H]	17 [V]
18	4060 MHz	9V	9H		9X [V]	9B [V]	17A [V]	18 [H]
19	4080 MHz	10H	10V	10H	10D [H]	10A [H]	10 [H]	19 [V]
20	4100 MHz	10V	10H		10X [V]	10B [V]	17B [V]	20 [H]
21	4120 MHz	11H	11V	11H	11D [H]	11A [H]	11 [H]	21 [V]
22	4140 MHz	11V	11H		11X [V]	11B [V]	18A [V]	22 [H]
23	4160 MHz	12H	12V	12H	12D [H]	12A [H]	12 [H]	23 [V]
24	4180 MHz	12V	12H		12X [V]	12B [V]	18B [V]	24 [H]

About the Author

In 1982, Mark Long co-authored *The World of Satellite Television* (Quantum Publishing), the number one best-selling reference guide to satellite TV. As technical editor for *Satellite Orbit*, guest lecturer and consultant, Mr. Long continues to advise on the far-reaching applications of this new technology.



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